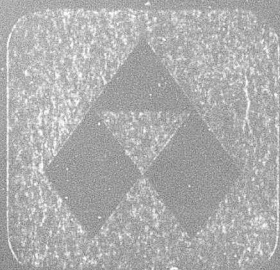


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MECHANICAL PROPERTIES, INCLUDING FRACTURE
TOUGHNESS AND FATIGUE, AND RESISTANCE TO
STRESS-CORROSION CRACKING OF STRESS-
RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

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Contract No. AF33(615)-3580
BPSN: 66 (687381-738106-62405514)
Fourth Quarterly Report
Dec. 15, 1966 - March 15, 1967
New Kensington, Pa. March 15, 1967

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ABSTRACT

The tensile and some compressive, shear, bearing, fatigue and fracture-toughness properties of a total of 130 samples of 2014, 2024, 6061, 7075 and 7178 aluminum alloy extrusions in the TX51X and "heat-treated-by-user" tempers have been determined. The extrusions ranged in thickness from 0.050 to 6.500 in. Ratios among the tensile, compressive, shear and bearing properties have also been computed.

Stress-corrosion tests of 18 samples of extrusions have been completed.

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FOURTH QUARTERLY REPORT

MECHANICAL PROPERTIES, INCLUDING FRACTURE TOUGHNESS AND FATIGUE, AND RESISTANCE TO STRESS-CORROSION CRACKING OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

I. Introduction.

The tests being made under this contract are for use in establishing design mechanical properties in MIL-HDBK-5A, including stress-strain and tangent-modulus curves, for 2014, 2024, 6061, 7075, 7079 and 7178 aluminum alloy extrusions in the TX51X tempers. For comparison, a limited number of similar tests are being made of extrusions in the "heat-treated-by-user" temper. Also, some fracture-toughness, axial-stress fatigue and stress-corrosion tests are being made.

This Fourth Quarterly Report summarizes the results of tensile, compressive, shear, bearing, fatigue, fracture toughness and stress-corrosion tests made to date on 102 samples in the TX51X temper and on 28 samples in the "heat-treated-by-user" tempers. The samples ranged in thickness from 0.050 to 6.500 in.

II. Material.

A total of 110 samples of commercially-produced extrusions in the TX51X temper and 18 samples in the 0 temper have been received from two producers. The section thickness and identification of each sample is shown in Table I. Eighteen of the as-received samples in the 0 temper have been heat treated, or heat treated and aged, in accordance with applicable

conditions in MIL-H-6088D. Five samples each of 2024-0 and 7075-0 were tested in two "heat-treated-by-user" tempers, so that the total number of samples tested in those tempers is 28.

III. Procedure.

Mechanical Properties

Tensile, compressive, shear and bearing specimens were taken at locations described in the Second Quarterly Report, dated September 15, 1966. The general dimensions of these specimens were shown in Figs. 1 to 3, inclusive, of that report. The testing procedures were as outlined in the First Quarterly Report, dated June 15, 1966.

Tensile and compressive modulus and stress-strain tests have been made of 27 samples of extrusions as described in the Third Quarterly Report, dated December 15, 1966.

Fracture-toughness tests were made in accordance with the methods described in ASTM STP 411* on fatigue-cracked single-edge-notched specimens from the longitudinal and long-transverse directions. The types of specimens are shown in Fig. 1; the proportions of these specimens are the same as those of specimens used by NASA, Lewis Research Center. The fracture parameters were calculated from relationships developed from the NASA calibration.

Values of the critical plane-strain stress intensity factor, K_{Ic} , were calculated using two values of load from the

* W. F. Brown and J. E. Srawley, "Plane Strain Fracture Toughness Testing of High Strength Metals", ASTM STP 411, February, 1967.

fracture-toughness tests. The first value was calculated using the load at the initial burst of unstable crack growth, as indicated by the initial significant deviation from linearity in the load deformation curve. In reporting the data, the degree of clarity of the initial deviation has been indicated by the use of the letter "P" to indicate a clear instability or pop-in, the letter "I" to indicate a less pronounced but yet abrupt initial deviation from linearity which is believed to be a suppressed pop-in, and "M" to indicate that the initial deviation was at the maximum or fracture load. The second value was calculated using the load at a 5 per cent secant offset, equivalent to about 2 per cent of crack extension; this was done as a result of recent recommendations of ASTM Committee E-24* that the secant-offset method be considered for establishing K_{IC} , and values thus determined are indicated in the table with the letter "S", or the letters "SM" when the load at the secant offset was the maximum or fracture load. Additional analysis of the results will be necessary to establish the permanent validity of the numbers. No values of K_{IC} are reported at this time for those materials (principally 2024-T351X and 6061-T6510) which exhibited no initial instability and/or general yielding.

Some axial-stress fatigue tests have been made of fourteen selected samples of extrusions. Procedures for making these tests were described in the First Quarterly Report.

* "Draft Recommended Practice for Notch-Bend Fracture Toughness Testing", ASTM Committee E24, February, 1967.

Resistance to Stress Corrosion

Stress-corrosion tests are being made of 43 selected samples of extrusions; of these, 31 are in the TX51X temper and 12 are in the "heat-treated-by-user" temper. Procedures for making these tests were described in the First Quarterly Report.

IV. Summary.

The results of tensile, compressive, shear and bearing tests of 102 samples of extrusions in the TX51X temper are shown, according to alloy and temper, in Tables II through IX; the corresponding properties for extrusions in the "heat-treated-by-user" tempers are shown in Table X. The tensile properties of all samples exceed the values in applicable Federal Specifications. Specified minimum tensile properties for extrusions are shown in Table XI; the values shown in this table are those published in the Aluminum Association Booklet, "Standards for Aluminum Mill Products", 1967. Some of these values, as indicated in the table, are lower than those shown presently in Federal Specifications. It is understood, however, that the values in "SAMP" will be in the next revisions of the Federal Specifications.

The ratios among the tensile, compressive and shear properties of the extrusions in the TX51X tempers and the "heat-treated-by-user" tempers are shown in Tables XII and XIII, respectively, and the ratios among the bearing and tensile properties of the corresponding extrusions are shown in Tables XIV and XV, respectively. The ratios among the properties at

different locations with regard to width and thickness are shown in Table XVI. The ratios among bearing properties obtained using edgewise specimens to those obtained using flatwise specimens are shown in Table XVII.

The results of the fracture-toughness tests are shown in Table XVIII and those of the axial-stress fatigue tests are shown in Fig. . 2 through 6.

The current status of the stress-corrosion tests is given in Table XIX. The tests of specimens of 18 samples were terminated after 84 days exposure, and tensile tests were made of these specimens to determine losses in tensile strength as a result of corrosion. The tests thus far indicate typical performances for the various materials.

Because it is expected that more samples of each alloy and temper will be tested, no analysis of the data already obtained is being presented at this time.

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V. Tables and Figures.

SAMPLES OF EXTENSIONS RETRIEVED AS OF MARCH 15, 1967
[AF33(615)-3580]

* Producer B; all others from Producer A
/ T3511 temper
* T8511 temper

TABLE II

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2014-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thick- ness, in.	Sample Cross- Sectional Area, in. ²	Number	Loca- tion*	Direc- tion†	Tensile		Elongation in 2 in. or 4D, %	Comp. Yield Stress, ‡ psi	Shear Ultimate Stress, psi	Flatwise		Bearing**	
					Ultimate Stress, psi	Yield Stress, ‡ psi				Ultimate Stress, psi e/D=1.5 e/D=2.0	Yield Stress, psi e/D=1.5 e/D=2.0	Ultimate Stress, psi e/D=1.5 e/D=2.0	Yield Stress, psi e/D=1.5 e/D=2.0
0.061	0.30	317950	T/2	L	67 100	62 200	9.0	64 600	--	105 600 138 800	88 200 103 900	--	--
0.070	0.24	318017#	T/2	LT	74 700	68 600	5.0**	64 600	--	--	--	--	--
0.073	0.16	317951	T/2	L	64 800	61 900	8.5	63 800	--	104 500 134 900	88 500 103 800	--	--
0.246	0.45	318130#	T/2	L	62 800	59 100	11.5	59 900	--	--	--	--	--
0.250	3.7	340154	T/2	L	64 100	60 400	10.0	61 000	44 300	110 100 136 900	94 300 107 500	--	--
0.271	0.40	317994	T/2	LT	64 800	62 000	12.5	63 800	46 400	109 200 141 300	93 200 113 700	--	--
					68 800	63 700	5.0**	69 300	45 700	--	--	--	--
					67 500	63 800	13.5	63 400	47 200	106 900 139 500	93 400 108 000	--	--
					71 700	54 600	6.2	--	--	--	--	--	--
0.625	0.50	317952	T/2	L	65 900	61 900	14.3	60 300	44 700	--	--	--	--
0.625	0.55	340291	T/2	L	77 500	71 900	10.7	68 000	42 100	--	--	--	--
0.750	1.4	317924	T/2	L	76 700	71 100	11.5	73 100	42 800	110 000 142 800	93 600 106 200	--	--
1.657	2.2	318046	T/4	LT	70 300	63 500	7.8	68 400	--	--	--	--	--
					72 600	66 100	10.5	67 800	41 500	105 700 135 800	88 000 103 100	--	--
					73 200	66 500	10.5	68 200	41 500	104 800 132 500	85 700 99 700	--	--
					67 400	60 200	7.8	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse;

‡ Offset equals 0.2 per cent

Producer B; all others from Producer A

** Specimens and fixtures cleaned ultrasonically in Toson 3 solvent

†† Offset equals 2 per cent of pin diameter

‡‡ Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length

TABLE III

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T3510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thick- ness, in.	Sample Cross- Sectional Area, in. ²	Loca- tion*	Direc- tion†	Tensile		Elongation in in. or 4D, %	Comp. Yield Stress, ‡ psi	Shear Ultimate Stress, § psi	Plate		Bearing**	
									Ultimate Stress, psi	Yield Stress, psi	Ultimate Stress, psi	Yield Stress, psi
0.075	0.70	318132#	T/2	65 900	53 000	18.0	45 200	--	96 800	78 300	94 300	--
0.094	0.30	318019#	T/2	70 500	58 100	15.0***	57 800	--	97 200	77 900	92 300	--
0.101	0.33	317885	T/2	63 800	52 800	14.5	58 000	--	102 500	76 200	90 000	--
0.106	0.31	317904	T/2	64 400	51 700	20.5	42 100	--	102 200	77 200	91 100	--
0.120	0.27	318018***	T/2	65 400	54 000	17.5	45 000	--	101 900	79 900	92 600	--
0.151	0.62	317886	T/2	69 900	54 400	17.0	45 400	--	102 300	78 300	91 200	--
0.255	2.8	317942	T/2	79 400	61 800	16.0	52 200	43 200	99 100	74 700	85 000	--
0.258	4.2	318047	T/2	76 100	55 400	19.0†††	59 900	41 800	105 300	81 000	99 400	--
0.375	0.62	317943	T/2	74 900	54 200	20.7†††	53 100	43 300	106 300	81 200	97 000	--
0.510	10.1	317926	T/2, W/2	73 700	49 300	21.5	58 100	42 200	107 200	75 900	97 700	--
0.525	1.9	318020#	T/2, W/4	75 700	57 100	8.0	37 400**	41 600	106 200	79 500	101 400	--
0.550	1.9	317826	T/2, W/4	64 900	48 500	15.0	50 000	40 600	100 600	77 400	94 800	--
0.642	5.8	317945	T/2, W/4	63 000	42 600	23.5	39 200	39 800	--	--	--	--
0.950	4.6	317944	T/2, W/4	62 600	48 500	11.0	40 300	41 200	102 000	74 400	87 900	--
1.150	5.6	318077	T/2, W/4	63 200	43 500	12.0	47 500	42 200	105 100	79 500	97 300	--
1.200	3.9	317946	T/2, W/4	78 900	62 600	15.5	54 500	40 800	100 900	76 700	92 300	--
1.450	7.3	318021#	T/2, W/4	71 800	53 200	16.4	58 300	39 800	100 600	76 700	91 600	--
1.705	4.8	340213	T/4, W/4	80 900	60 600	8.5	55 900	39 000	102 400	73 900	90 500	--
2.520	8.8	318133**	T/4, W/4	69 500	50 200	15.0	54 400	39 730	104 000	78 000	96 100	--
4.000	24.0	340214	T/4, W/4	78 700	61 500	15.6	55 500	39 600	100 000	78 000	93 900	--
2.760	29.6	318048	T/4, W/4	68 800	52 200	14.9	51 300	40 100	102 900	75 400	93 800	--
			T/2, W/2	69 600	50 700	16.4	51 900	38 400	105 500	75 400	93 600	--
			T/2, W/2	80 300	63 500	14.1	58 000	39 900	105 100	77 400	92 600	--
			T/2, W/2	80 400	62 300	13.5	58 100	40 000	104 200	76 500	91 200	--
			T/2, W/2	68 000	49 000	15.5	52 100	39 700	104 200	76 500	91 200	--
			T/2, W/2	79 800	60 800	14.6	52 600	39 100	110 800	76 700	95 900	--
			T/2, W/2	82 500	62 300	15.0	59 400	40 600	108 600	76 400	93 000	--
			T/2, W/2	59 800	48 600	14.0	60 700	39 000	103 500	76 800	94 500	--
			T/2, W/2	82 100	61 800	15.0	52 600	38 800	104 000	75 000	95 900	--
			T/2, W/2	68 900	49 500	12.0	59 200	39 300	103 500	76 800	94 500	--
			T/2, W/2	61 100	46 200	14.1	49 800	38 500	104 000	77 100	95 900	--
			T/2, W/2	67 000	46 200	14.5	59 400	38 500	102 300	75 600	91 800	--
			T/2, W/2	80 900	61 900	12.9	50 400	37 800	97 000	76 700	93 000	--
			T/2, W/2	65 000	47 000	12.5	49 200	37 800	92 600	76 700	93 000	--
			T/2, W/2	67 800	44 100	14.0	57 700	38 300	102 300	75 600	91 800	--
			T/2, W/2	79 800	62 300	8.0	51 400	36 700	97 000	76 000	90 900	--
			T/2, W/2	64 400	47 700	14.0	56 500	37 800	92 600	76 700	93 000	--
			T/2, W/2	78 400	60 400	17.5	56 800	36 700	94 000	73 400	88 200	--
			T/2, W/2	62 900	47 800	5.7	49 800	39 700	94 000	73 400	88 200	--
			T/2, W/2	60 100	42 800	13.5	54 900	40 900	92 600	76 600	93 900	--
			T/2, W/2	77 100	58 800	5.2	47 900	37 100	96 600	74 500	85 200	--
			T/2, W/2	58 600	43 500	13.5	55 000	39 100	90 900	74 100	86 000	--
			T/2, W/2	76 800	58 900	6.0	49 700	37 700	91 600	74 100	86 000	--
			T/2, W/2	60 500	47 000	6.0	47 800	39 200	91 600	72 900	90 700	--
			T/2, W/2	58 900	42 500	6.0	47 800	39 200	91 600	72 900	90 700	--

* T - Thickness; W - Width

† Offset equals 0.2 per cent

‡ Producer B; all others from Producer A

** Specimens and fixtures cleaned ultrasonically in Teson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

‡‡ Average of two tests; all others, single tests.

*** Sub-size sheet-type specimen; 1/4-in. wide; 1-in. gage length.

*** Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

** Samples were in the main.

TABLE IV

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 2024-T8510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thick- ness, in.	Sample Cross- Sectional Area, sq. in.	Loca- tion*	Direc- tion†	Tensile Ultimate Stress, psi	Tensile Yield Stress,‡ psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress,§ psi	Shear Ultimate Stress, psi	Bearing**				
									Flatwise		Edgewise		
									Ultimate Stress, psi	Yield Stress, psi†	Ultimate Stress, psi	Yield Stress, psi†	
									e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	
0.075	0.70	318022#	T/2	L	72 400	68 400	70 900	--	110 200	141 400	98 900	114 800	--
				LT	77 500	69 600	73 300	--	--	--	--	--	--
0.094	0.30	318134#	T/2	L	73 900	69 200	65 700	--	109 000	139 500	100 000	118 000	--
0.101	0.33	317887	T/2	L	73 200	69 800	71 500	--	106 800	141 300	95 700	122 400	--
0.106	0.31	317886	T/2	L	70 200	66 200	66 800	--	107 600	141 300	95 500	117 600	--
0.120	0.27	318023#	T/2	L	71 300	67 700	67 800	--	109 600	142 300	97 800	110 300	--
0.151	0.82	317889	T/2	L	71 400	67 000	70 400	--	112 400	144 800	101 200	117 800	--
				LT	75 200	70 300	69 600	--	--	--	--	--	--
0.255	2.8	317890	T/2	L	77 600	70 900	75 500	44 200	113 100	146 600	99 400	117 800	--
				LT	76 600	72 200	73 900	42 900	114 000	145 800	99 900	119 400	--
0.258	4.2	318082	T/2	L	75 400	68 400	73 100	43 500	118 000	143 800	101 000	115 300	--
				LT	74 800	70 000	71 800	42 800	109 700	141 400	98 700	108 100	--
0.375	0.62	317891	T/2	L	70 100	66 500	64 800	43 400	107 100	136 800	98 200	107 800	--
				LT	67 700	63 400	--	--	--	--	--	--	--
0.510	10.1	317892	T/2, W/2	L	73 600	62 700	70 500	41 600	108 200	139 800	98 000	109 400	--
				LT	71 700	66 900	69 800	41 500	--	--	--	--	--
0.525	1.9	318024#	T/2, W/4	L	72 200	65 600	67 500	41 400	--	--	--	--	--
				LT	71 000	65 200	--	--	--	--	--	--	--
				L	71 400	64 100	67 000	40 900	104 500	135 300	91 600	106 800	--
0.550	1.9	317922	T/2, W/4	L	70 700	65 000	64 200	40 600	104 500	135 300	91 600	106 800	--
				LT	74 100	67 800	70 200	41 300	108 600	139 600	94 800	112 400	--
0.642	5.8	317894	T/2, W/4	L	72 000	67 200	69 700	41 200	105 700	135 800	96 600	112 900	--
				LT	75 300	69 800	70 300	41 700	106 200	137 200	94 100	112 200	--
0.950	4.6	317893	T/2, W/4	L	73 500	68 500	70 300	40 100	104 000	134 900	96 600	112 200	--
				LT	70 100	65 700	67 400	41 700	--	--	--	--	--
1.150	5.6	318078	T/2, W/4	L	73 200	66 200	68 800	40 900	106 900	136 700	94 800	111 000	89 700 107 500
				LT	71 800	67 200	69 300	41 000	106 300	137 100	96 000	112 600	--
				L	71 300	64 900	69 000	39 900	105 300	136 500	94 300	111 400	--
1.200	3.9	317895	T/2, W/4	L	74 600	68 500	70 700	41 500	106 200	135 200	93 800	110 100	101 300 131 000
				LT	71 300	67 200	69 000	42 000	106 600	135 500	95 200	112 900	101 900 130 700
1.450	7.3	318025#	T/2, W/4	L	74 800	69 500	70 900	42 000	105 400	137 800	93 700	113 900	101 300 131 700
				LT	74 300	69 000	70 100	41 300	--	--	--	--	--
1.705	4.8	340169	T/4, W/4	L	71 400	63 200	65 700	40 000	104 800	133 100	89 500	105 000	--
				LT	71 000	63 400	65 700	39 000	105 700	135 800	90 900	108 000	104 300 129 400
4.000	24.0	340225	T/4, W/4	L	69 900	61 800	62 800	39 000	96 900	128 100	88 000	104 400	93 200 122 000
				LT	67 700	61 500	62 900	37 200	100 600	131 400	86 600	104 300	89 300 124 900
				L	68 600	60 800	61 600	38 100	95 200	126 800	85 900	105 900	87 600 116 900
				LT	66 200	60 500	61 500	36 200	--	--	--	--	--
2.760	29.6	318079	T/4, W/4	L	63 600	58 200	62 800	36 900	89 200	121 600	***	107 300	95 600 121 900
				LT	63 400	58 200	64 200	36 800	95 100	124 100	90 500	104 600	87 700 126 900
				L	64 900	60 500	64 300	39 100	93 700	122 800	89 600	105 400	88 900 126 000
				LT	70 100	63 200	63 700	40 600	97 000	127 400	87 800	101 700	89 400 118 400
				LT	65 600	61 800	63 900	41 100	--	--	--	--	*** 108 100
				ST	64 100	59 600	64 200	39 200	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse

‡ Offset equals 0.2 per cent.

§ Producer B: all others from Producer A

** Specimens and fixtures cleaned ultrasonically in Tescan 3 solvent.

†† Offset equals 2 per cent of pin diameter.

*** Bearing specimen failed before reaching yield stress (2 per cent offset).

TABLE V

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 6061-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-358Q]

Section Thick- ness, in.	Sample Cross- Sectional Area, in. ²	Loca- tion*	Direc- tion†	Tensile Tensile Stress, Yield psi		Comp. Yield Stress, ‡ psi	Shear Ultimate Stress, psi.	Bearing**			
								Flatwise		Edgewise	
				Ultimate Stress, psi	Yield Stress, psi			Ultimate Stress, psi	Yield Stress, psi	Ultimate Stress, psi	Yield Stress, psi
								e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0
0.050	0.42	318136#	L	45 000	42 400	41 500	--	79 400	66 900	--	--
0.075	0.59	317857	L	45 900	39 300	40 100	--	74 200	59 400	--	--
			LT	44 800	37 200	38 500	--	89 100	57 400	--	--
0.090	0.27	318027#	L	44 700	42 100	41 300	--	77 600	66 200	--	--
0.125	0.61	317846	L	43 200	38 700	38 700	--	70 900	58 000	--	--
			LT	41 900	36 000	38 600	--	--	--	--	--
0.126	0.30	317847	L	43 900	39 700	39 800	31 400	--	--	--	--
0.250	0.36	317848	L	43 000	38 600	38 800	30 800	--	--	--	--
0.310	6.3	317905	L	47 700	43 200	42 300	31 100	79 500	66 800	73 200	--
			LT	49 100	43 400	44 800	30 700	80 700	67 500	79 500	--
0.315	5.8	317953	L	45 500	40 200	40 100	34 400	78 000	65 700	71 000	--
			LT	44 700	38 000	40 100	33 600	80 000	65 300	70 900	--
0.375	8.6	317927	L	45 900	42 000	41 600	36 500	80 000	67 400	75 300	--
			LT	45 300	40 000	42 000	36 100	80 600	67 400	75 300	--
0.375	7.7	318083	L	46 600	42 500	41 800	35 400	79 800	68 400	75 000	--
			LT	43 700	39 400	42 900	33 800	81 000	69 900	75 000	--
0.918	1.3	317906	L	45 900	41 800	41 700	33 000	78 000	68 500	73 200	--
			LT	45 500	40 800	43 500	--	--	--	--	--
1.240	2.7	317907	L	48 100	43 000	44 100	28 700	72 600	57 900	66 800	66 900
			LT	48 800	43 500	44 800	28 400	--	--	--	--
1.960	4.4	317896	L	51 600	46 800	46 800	29 600	76 000	60 600	71 000	--
			LT	51 600	46 800	47 800	29 100	75 100	60 000	68 900	59 700
			L	52 000	47 200	43 000	--	--	--	96 300	70 500
3.000	15.0	340226	L	52 200	39 300	43 000	--	--	--	--	--
			LT	52 900	49 900	50 100	27 800	76 100	63 200	73 200	63 100
			L	47 700	43 100	46 200	27 500	74 500	61 800	74 700	73 400
			LT	52 000	48 700	48 700	27 800	75 600	62 500	72 400	60 300
			L	46 900	43 800	45 500	26 800	--	--	74 100	60 400
			LT	47 100	40 800	44 700	28 700	--	--	--	--
6.500	33.2	317897	L	51 500	46 100	46 000	27 000	72 600	57 200	71 000	57 200
			LT	44 600	38 000	40 700	27 000	69 300	53 500	68 200	54 700
			L	51 000	45 700	45 700	26 800	71 500	56 500	86 600	67 500
			LT	44 600	37 000	39 600	26 600	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse

‡ Offset equals 0.2 per cent.

Producer B; all others from Producer A

** Specimens and fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

††† Sub-size sheet-type specimen; 1/4-in. wide; 1-in. gage length.

TABLE VI

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7075-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness, in.	Sample Cross-Sectional Area, in. ²	Number	Location	Direction	Tensile Ultimate Stress, psi	Tensile Yield Stress, psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress, psi	Shear Ultimate Stress, psi	Bearing**			
										Flatwise		Edgewise	
										Ultimate Stress, psi	Yield Stress, psi	Ultimate Stress, psi	Yield Stress, psi
										e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0
0.065	0.18	317899	T/2	L	87 000	79 200	11.0	75 400	--	126 600	158 400	106 900	123 100
0.065	0.27	318031#	T/2	L	85 200	77 700	10.5	77 300	--	125 900	158 700	102 400	125 400
				LT	83 000	74 500	12.0***	77 800	--	--	--	--	--
0.080	0.18	317858	T/2	L	88 200	81 900	12.0	80 500	--	125 500	159 900	109 600	124 900
0.133	0.97	318029#	T/2	L	84 200	75 800	9.0	76 600	--	124 600	156 200	107 000	123 900
				LT	82 800	72 600	15.0***	77 900	--	--	--	--	--
0.160	0.26	318030#	T/2	L	87 500	79 400	12.0	82 800	--	126 500	160 100	108 600	128 600
				LT	85 500	77 900	11.5	73 800	48 500	126 100	158 000	104 800	123 400
0.260	1.2	318028#	T/2	L	84 100	74 400	15.0***	--	--	--	--	--	--
				LT	82 100	82 700	11.0	85 300	49 400	--	--	--	--
0.313	0.51	317908	T/2	L	88 000	80 900	11.0	79 200	48 000	125 000	160 600	104 400	128 600
0.275	2.2	317954	T/2	L	83 500	74 600	13.0	82 100	47 100	--	--	--	--
				LT	81 500	74 600	12.0	80 400	49 900	129 100	160 200	113 000	128 500
0.438	7.2	317859	T/2	L	87 600	80 300	12.0	85 700	48 100	131 000	153 100	112 200	134 200
				LT	86 100	77 700	11.5	78 300	46 600	121 900	155 400	99 400	119 000
0.453	1.9	318032#	T/2	L	83 800	76 500	12.0	78 400	45 200	--	--	--	--
				LT	78 700	70 800	10.0	--	--	--	--	--	--
				LT	88 300	81 700	11.5	80 400	47 500	127 600	161 200	108 500	127 200
0.935	7.2	340155	T/2, W/4	L	83 500	76 100	12.0	81 100	46 100	129 400	157 900	107 600	131 600
				LT	82 900	75 300	12.0	77 600	47 000	125 900	157 400	105 600	124 300
				LT	82 000	75 300	12.0	79 400	45 600	--	--	--	--
1.023	1.8	318033#	T/2, W/4	L	86 600	72 800	9.0	84 200	47 100	121 000	156 100	102 000	123 100
1.188	27.1	317860	T/2, W/4	L	84 300	78 300	11.0	79 500	51 100	125 900	159 400	108 600	121 400
				LT	85 100	78 000	13.0	81 000	47 900	129 000	158 500	111 500	128 600
				LT	83 000	74 500	12.0	77 100	48 200	125 300	155 600	107 400	119 400
1.500	1.8	317955	T/2	L	83 000	74 500	13.0	80 000	47 500	128 700	159 900	110 800	127 800
				LT	93 600	86 700	9.5	88 000	48 200	122 400	156 300	102 300	121 400
				LT	77 600	67 500	2.2	--	--	--	--	--	--
2.000	3.1	317861	T/4	L	93 400	86 700	11.0	86 400	49 200	127 300	164 500	108 000	126 400
				LT	91 100	84 100	10.0	84 900	47 700	120 700	155 700	102 300	122 900
				LT	79 100	68 700	8.8	75 100	--	--	--	--	--
2.190	17.0	318137#	T/4, W/4	L	83 800	76 000	10.0	76 300	46 300	120 600	151 400	105 000	125 000
				LT	75 000	69 300	3.6	76 400	45 200	119 900	149 200	104 400	124 300
				LT	61 700	73 300	10.0	72 400	44 500	117 900	149 100	100 900	120 700
				LT	77 400	68 800	9.0	73 000	43 100	120 300	152 200	103 800	121 500
				ST	70 500	61 500	3.9	72 000	--	--	--	--	--
3.040	13.8	318138#	T/4, W/4	L	86 700	79 100	10.0	80 700	46 200	120 100	152 000	104 500	124 300
				LT	76 000	67 000	7.0	73 900	--	118 500	149 300	106 400	126 300
				LT	84 400	76 700	10.5	77 800	45 400	118 300	151 400	101 800	121 400
				LT	75 400	66 700	8.2	72 800	43 700	--	--	--	--
				ST	73 400	63 200	6.0	70 400	43 600	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse

‡ Offset equals 0.2 per cent.

Producer B; all others from Producer A.

** Specimens and fixtures cleaned ultrasonically in Tescor 3 solvent.

†† Offset equals 2 per cent of pin diameter.

*** Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

TABLE VII

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7075-T73510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thick- ness in.	Sample		Loca- tion*	Direc- tion†	Tensile		Elongation in 2 in. or 4D, %	Comp. Yield Stress, ‡ psi	Shear Ultimate Stress, psi.	Bearing**		Yield Stress, psi††	Yield Stress, psi††
	Gross- Sectional Area, in. ²	Number			Ultimate Stress, psi	Yield Stress, psi				Flatwise	Edge-wise		
										Ultimate Stress, psi e/D=1.5 e/D=2.0	Ultimate Stress, psi e/D=1.5 e/D=2.0		
0.080	0.18	317862	T/2	L	79 400	71 100	9.0	71 300	--	120 600 153 800	103 200 120 500	--	--
0.313	0.51	317909	T/2	L	76 100	66 200	11.5	69 400	44 200	--	--	--	--
0.375	2.2	317900	T/2	L	74 900	64 300	11.5	65 800	44 300	123 400 146 300	92 300 109 400	--	--
0.438	7.2	317910	T/2	LT	72 600	62 300	11.0	66 600	42 800	--	--	--	--
0.935	7.2	340292	T/2, W/4	L	77 200	67 500	12.0	69 800	45 100	118 100 152 800	98 900 117 200	--	--
			T/2, W/4	LT	76 600	67 600	10.0	71 800	44 100	118 800 152 600	97 600 120 000	--	--
			T/2, W/2	L	79 200	70 300	12.5	70 600	44 600	--	--	--	--
			T/2, W/2	LT	76 600	67 700	12.5	71 400	43 300	--	--	--	--
			T/2	L	77 700	68 700	13.0	68 800	43 800	--	--	--	--
1.500	1.8	317956	T/2	LT	76 000	66 900	12.0	69 800	42 900	--	--	--	--
			T/2	L	79 700	72 100	11.0	73 800	44 700	111 100 145 700	93 800 111 500	--	--
2.000	3.1	317948	T/4	L	71 800	61 600	6.2	--	--	--	--	--	--
			T/2	L	78 800	71 100	11.5	72 800	44 200	111 400 146 000	90 700 109 400	--	--
			T/2	LT	77 800	70 300	12.0	71 400	43 600	112 200 143 800	92 300 109 400	--	--
					70 200	60 500	6.2	65 200	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse.

‡ Offset equals 0.2 per cent.

** Specimens and fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

TABLE VIII

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRETCHED 7079-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness in.	Sample Cross- Sectional Area, in. 2	Loca- tion*	Direc- tion*	Tensile		Elongation in 2 in. or 4D, %	Comp. Yield Stress, # psi	Shear Ultimate Stress, psi.	Bearing**			
				Ultimate Stress, psi	Yield Stress, psi				Flatwise		Edgewise	
									Ultimate Stress, psi e/D=1.5 e/D=2.0	Yield Stress, psi e/D=1.5 e/D=2.0	Ultimate Stress, psi e/D=1.5 e/D=2.0	Yield Stress, psi e/D=1.5 e/D=2.0
0.161	0.72	T/2	L	86 400	79 300	10.5	78 400	--	124 400 156 500	106 300 123 300	--	--
			LT	84 100	75 100	16.0**	84 100	--	--	--	--	--
0.251	0.82	T/2	L	85 700	78 900	12.0	79 700	48 400	125 100 156 100	105 200 118 600	--	--
			LT	81 000	72 600	14.1	79 600	47 500	--	--	--	--

* T - Thickness; W - Width
† L - Longitudinal; T - Transverse
** Specimen

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse

Offset equals 0.2 per cent.

** Specimens and fixtures cleaned ultrasonically in Toson 3 solvent.

†† Offset equals 2 per cent of pin diameter.

*** Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

TABLE IX

MECHANICAL PROPERTIES OF STRESS-RELIEVED STRUTCHED 7178-T6510 ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Section Thickness In.	Sample Cross-Sectional Area ² in.	Number	Location*	Direction†	Tensile		Kelongation in 2 in. or 4D, %	Comp. Yield Stress, # psi	Shear Ultimate Stress, # psi	Bearing**		Yield Stress, # psi††	Ultimate Stress, # psi††	Yield Stress, # psi††	Ultimate Stress, # psi††
0.063	0.37	317902	T/2	L	95 400	89 900	9.5	90 400	--	133 500	168 900	117 400	138 900	--	--
0.142	1.0	318016	T/2	LT	94 200	87 500	10.0**	93 800	--	131 600	166 700	114 900	137 300	--	--
0.154	0.42	318035#	T/2	LT	92 000	83 400	14.0**	92 300	--	138 300	172 600	120 300	138 500	--	--
0.162	0.49	317903	T/2	L	92 200	85 800	9.5	90 800	--	132 600	164 400	114 300	129 800	--	--
0.265	0.88	317996	T/2	L	95 400	89 400	10.0	89 200	51 800	132 600	166 600	112 700	125 600	--	--
0.625	6.9	317997	T/2, W/4	L	93 600	86 900	10.7	85 500	51 800	133 400	164 800	114 300	134 900	--	--
0.780	1.7	340254	T/2, W/2	LT	91 100	81 500	10.2	88 200	50 000	132 400	158 200	113 600	134 200	--	--
1.200	3.9	318139#	T/2, W/4	L	92 600	85 900	10.7	83 900	51 800	131 000	166 500	113 600	129 300	--	--
1.438	6.4	317957	T/2	LT	89 400	80 700	11.4	87 500	50 200	--	--	--	--	--	--
2.130	15.5	318140#	T/4, W/4	L	99 200	93 400	10.0	94 300	50 600	137 200	171 500	110 800	133 100	--	--
			T/2, W/2	LT	88 900	79 900	8.0	91 000	50 200	132 300	166 700	113 900	137 700	122 400	161 500
			T/2, W/2	LT	86 300	79 600	9.5	88 900	50 700	132 200	166 300	111 400	139 300	122 400	159 200
			T/2	LT	93 200	87 500	9.5	86 400	49 500	--	--	--	--	--	--
			T/2	LT	85 400	78 900	7.5	97 200	52 500	133 100	167 600	115 700	137 100	--	--
			T/2	LT	101 300	95 500	8.5	--	--	--	--	--	--	--	--
			T/2	LT	85 400	76 900	4.7	--	--	--	--	--	--	--	--
			T/4, W/4	L	91 100	83 300	8.0	83 700	49 100	124 400	161 700	113 600	134 300	112 700	145 000
			T/2, W/2	LT	82 600	75 000	5.0	82 600	46 600	128 400	155 400	114 300	134 900	108 800	148 100
			T/2, W/2	L	88 600	73 500	2.0	80 100	43 500	122 600	159 100	110 700	129 300	108 800	144 600
			T/2	LT	82 400	73 500	2.5	79 200	46 000	123 800	157 600	108 100	128 500	102 800	140 600
			ST	ST	76 600	66 600	2.6	77 300	--	--	--	--	--	--	--

* T - Thickness; W - Width

† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse.

‡ Offset equals 0.2 per cent.

Producer B; all others from Producer A.

** Specimens and Figures cleaned ultrasonically in Tescan 3 solvent.

†† Offset equals 2 per cent of pin diameter.

*** Sub-size sheet-type specimen; 1/8-in. wide; 1/2-in. gage length.

TABLE X
MECHANICAL PROPERTIES OF EXTRUSIONS IN THE "HEAT-TREATED-BY USER" TEMPER
AF33(615)-3580

Alloy and Temper	Sample				Tensile Ultimate Stress, † psi	Tensile Yield Stress, † psi	Elongation in 2 in. or 4D, %	Comp. Yield Stress, † psi	Shear Ultimate Stress, † psi	Flatwise		Edgewise	
	Section Thickness in.	Cross-sectional Area, in. ²	Location* Number	Direction†						Ultimate Stress, † psi	Yield Stress, † psi	Ultimate Stress, † psi	Yield Stress, † psi
2014-T62	0.185	1.0	340248§	T/2	68 500	62 800	11.5	--	--	109 200	141 200	94 400	112 000
	0.300	6.3	318084	T/2	74 200	67 200	9.5	70 100	43 100	112 200	141 500	97 300	115 100
	0.499	1.4	318085	T/2	74 700	63 400	12.5	72 600	41 400	112 500	143 500	96 600	115 800
				L	71 700	65 100	13.0	69 100	41 300	110 200	141 800	93 000	110 100
2024-T42				LT	70 300	63 800	10.2	67 300	--	--	--	--	--
	0.064	0.27	318088§	T/2	65 000	44 500	20.5	44 800	--	103 800	123 100	75 300	86 900
	0.083	0.27	318086	T/2	69 100	43 500	18.0	47 500	--	--	--	--	--
	0.430	2.1	340241§	T/2	66 100	41 600	21.0	44 000	--	98 400	121 200	74 000	87 600
				L	67 100	42 400	18.0	43 900	38 800	100 800	125 000	70 600	86 600
	0.500	0.64	340243	T/2	72 400	48 200	18.5	55 200	38 000	107 500	128 800	73 800	90 200
				LT	72 100	47 700	21.0	58 700	39 400	106 800	134 500	76 000	91 800
	2.562	6.4	340245	T/4, W/4	79 800	54 800	17.5	50 000	40 900	104 300	130 300	72 800	89 800
				L	82 100	58 500	15.5	57 100	38 100	104 300	130 500	72 200	84 700
				L	69 700	47 400	14.1	50 000	38 500	--	--	--	--
2024-T62				T/2, W/2	80 300	56 500	15.3	47 600	41 700	--	--	--	--
				ST	61 000	45 300	8.5	47 300	--	--	--	--	--
	0.064	0.27	318089§	T/2	65 700	44 900	7.5	54 100	--	107 500	132 200	86 900	102 500
	0.083	0.27	318087	T/2	69 500	55 200	11.0	57 900	--	109 300	135 400	94 100	111 700
	0.430	2.1	340242§	T/2	68 800	53 900	7.0	60 000	--	100 900	130 600	81 700	99 300
	0.500	0.64	340244	T/2	68 300	57 700	12.0	57 500	38 700	102 800	134 100	82 300	100 000
				L	67 700	57 700	12.0	61 400	37 600	101 400	131 900	82 900	101 700
2024-T62	2.562	6.4	340246	T/4, W/4	71 800	59 300	11.0	59 500	40 000	95 800	125 000	80 500	99 400
				L	68 100	58 000	9.0	58 400	38 300	96 800	127 400	81 500	100 600
				LT	66 100	55 300	7.0	56 200	36 500	96 900	120 200	82 200	95 500
				ST	62 000	51 500	6.5	53 700	38 400	--	--	--	--

* T - Thickness; W - Width
† L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse
‡ Offset equals 0.2 per cent
§ Producer B; all others from Producer A
**Specimens and Fixtures cleaned ultrasonically in Toson 3 solvent
††Offset equals 2 per cent of pin diameter

TABLE X (Concluded)
MECHANICAL PROPERTIES OF EXTRUSIONS IN THE "HEAT-TREATED-BY USER" TEMPER
AF33(615)-3530

Alloy and Temper	Sample			Tensile		Comp. Yield Stress, + psi	Shear Ultimate Stress, + psi	Platewise		Edgewise	
	Section Thickness in.	Cross-Sectional Area, in. ²	Location, Orientation	Ultimate Stress, psi	Yield Stress, + psi			Ultimate Stress, psi	Yield Stress, + psi	Ultimate Stress, psi	Yield Stress, + psi
5051-T62	0.246	4.6	318090 T/2	48 000	43 800	45 100	35 300	80 200	104 000	69 400	80 500
	1.625	3.9	418091 T/4, W/4	46 100	41 500	44 000	35 200	82 400	105 200	73 800	85 400
			T/2, W/2	45 000	39 400	42 500	32 200	75 900	98 000	67 500	77 700
				45 900	41 500	42 700	32 700	76 300	96 300	69 200	76 700
				45 600	40 300	43 200	31 200				
7075-T62	0.063	0.34	318094\$ T/2	80 700	70 500	74 900	--	118 000	152 200	96 900	118 600
	0.126	0.17	318092 T/2	79 200	70 000	76 700	--	--	--	--	--
	0.300	1.7	318096 T/2	91 000	83 200	88 400	48 700	124 000	158 500	106 600	125 700
				84 800	76 000	85 900	47 600				
	1.225	21.2	318096\$ T/2, W/4	87 100	78 000	81 800	46 200	124 900	153 200	110 200	124 900
			T/2, W/2	81 000	72 400	79 300	46 500				
7075-T73X	2.250	4.1	318100 T/4	84 600	75 100	78 500	47 500	124 000	156 800	107 900	125 000
			T/2	80 000	71 400	77 000	46 100	123 200	151 100	107 300	127 800
				92 700	85 100	88 000	48 800	122 200	152 800	106 500	125 000
				89 300	81 900	85 600	47 100	120 300	149 100	103 800	122 200
				76 700	66 100	72 400	46 300	--	--	--	--
								105 800	139 100	87 000	106 800
7178-T62	0.063	0.34	318095\$ T/2	71 300	61 300	63 100	--	--	--	--	--
	0.126	0.17	318093 T/2	70 500	56 200	61 800	--	--	--	--	--
	0.300	1.7	318097 T/2	81 800	78 600	75 000	122 700	145 500	93 200	113 100	--
	1.225	21.2	318099\$ T/2, W/4	76 800	67 000	71 800	42 200	113 100	148 000	98 900	119 300
			T/2, W/2	78 400	69 600	73 500	43 300				
				73 600	62 800	70 900	43 800	114 200	144 900	98 000	117 200
7178-T62	2.250	4.1	318101 T/4	73 800	64 500	68 000	42 400	114 100	144 900	95 300	115 100
			T/2	79 800	72 700	73 800	45 300	118 800	150 600	98 000	118 000
				75 100	67 300	69 500	42 100	119 900	142 400	93 800	110 900
				69 800	59 900	63 400	42 900	--	--	--	--
	0.050	0.15	340247 T/2	96 700	88 600	--	--	135 400	166 100	117 300	133 900
	0.051	0.20	318102\$ T/2	96 400	85 700	97 700	--	136 400	167 900	125 900	147 000
7178-T62	0.403	3.0	340249 T/2	98 200	89 900	--	51 900	134 100	167 900	116 500	136 400
							50 300	141 500	154 800	120 800	149 900

* T - Thickness; W - Width;
+ L - Longitudinal; LT - Long-Transverse; ST - Short-Transverse
\$ Offset equals 0.2 per cent
\$ Producer B; all others from Producer A
*Specimens and fixtures cleaned ultrasonically in Toson 3 solvent
+Offset equals 2 per cent of pin diameter

TABLE X (Concluded)

(Concluded)

TABLE XI

SPECIFIED MINIMUM VALUES* FOR ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Alloy and Temper	Thickness, in.	Area, sq. in.	Tensile			Federal Specification
			Ultimate Stress, psi	Yield Stress,† psi	Elongation 2 in. or 4D, %	
2014-T62	≤0.749	All	60 000	53 000	7	QQ-A-200/2b
-T6510	≤0.499	All	60 000	53 000	7	
	0.500-0.749	All	64 000	58 000	7	
	≥0.750	≤25	68 000	60 000	7	
2024-T3510,	≤0.249	All	57 000	42 000	12	QQ-A-200/3b
-T3511	0.250-0.749	All	60 000	44 000	12	
	0.750-1.499	All	65 000	46 000	10	
	≥1.500	≤25	70 000	52 000	10	
	≥1.500	≥25, ≤32	68 000	48 000	8	
-T42	≤0.749	All	57 000	38 000	12	
	≥1.500	≤25	57 000	38 000	10	
-T8510,	0.050-0.249	All	64 000	56 000	4	
-T8511	0.250-1.499	All	66 000	58 000	5	None
	≥1.500	≤32	66 000	58 000	5	
-T62	≤0.749	-	--	--	-	
	≥1.500	-	--	--	-	
6061-T62*,	≤0.249	All	38 000	35 000	8**	QQ-A-200/8b
-T6510	≥0.250	All	38 000	35 000	10	
7075-T62*,	≤0.249	All	78 000	70 000	7	QQ-A-200/11b
-T6510	0.250-0.499	All	81 000	73 000	7	
	0.500-2.999	All	81 000	72 000	7	
	3.000-4.499	≤20	81 000	71 000	7	
-T73X,††	≤0.249	-	--	--	-	None
-T73510	0.250-0.499	-	--	--	-	
	0.500-1.499	-	--	--	-	
	1.500-2.999	-	--	--	-	
7079-T62*,	≤0.249	≤20	75 000	67 000	7	QQ-A-200/12b
-T6510	0.250-0.499	≤20	77 000	68 000	7	
7178-T62*	≤0.061	≤20	79 000**	73 000**	5	QQ-A-200/13
	0.250-1.499	≤20	82 000**	74 000**	5	
-T6510	0.062-0.249	≤20	84 000**	76 000**	5	
	0.250-1.499	≤25	87 000**	78 000**	5	

* All values are as shown in the Aluminum Association Booklet, "Standards for Aluminum Mill Products," 1967.

† Offset equals 0.2 per cent.

* In QQ-A-200/8b, 11b, 12b and 13, values for T6 temper apply also for extrusions heat treated and aged by user (T62 temper).

** Lower than in Federal specifications.

†† "T73X" signifies T73-type temper for 7075 when heat treated and aged by user. Standard designation not yet assigned.

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

* T - Thickness; W - Width
 † Producer B; all others from Producer A
 ‡ Samples were in the T35ll temper
 § Sample was in the T68ll temper

TABLE XII

TABLE XII
(Continued)
RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3580]

Alloy and Temper	Section Thickness, in.	Sample Gross- Sectional Area, in. ²	Number	Location*	TTS (LT)		TTS (ST)		TTS (LT)		TTS (ST)		CPS (LT)		CPS (ST)		SUS (LT)		SUS (ST)	
					TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)
2024-T6510	0.550	1.9	317922	T/2, W/4	0.97	0.97	0.98	0.98	1.04	1.03	0.56	0.56	1.04	1.03	0.56	0.56	0.56	0.56	---	---
	0.642	5.8	317804	T/2, W/4	0.95	0.95	0.96	0.96	1.02	1.02	0.55	0.55	1.02	1.02	0.55	0.55	0.55	0.55	---	---
	0.950	4.6	317633	T/2, W/4	0.97	0.97	1.02	1.02	1.04	1.05	0.57	0.57	1.04	1.05	0.57	0.57	0.57	0.57	---	---
	1.150	5.6	318078	T/2, W/2	0.99	0.99	1.03	1.03	1.06	1.04	0.56	0.56	1.06	1.04	0.56	0.56	0.56	0.56	---	---
	1.200	3.9	317895	T/2, W/4	0.96	0.96	0.98	0.98	1.02	1.03	0.56	0.56	1.02	1.03	0.56	0.56	0.56	0.56	---	---
	1.450	7.3	318025†	T/2, W/4	0.95	0.95	0.97	0.97	1.02	1.00	0.56	0.56	1.02	1.00	0.56	0.56	0.56	0.56	---	---
	1.705	4.8	340169	T/4, W/4	0.99	0.99	1.00	1.00	1.04	1.00	0.56	0.56	1.04	1.00	0.56	0.56	0.56	0.56	---	---
	2.760	29.6	318079	T/2, W/2	0.97	0.97	0.98	0.98	1.00	1.01	0.54	0.54	1.00	1.01	0.54	0.54	0.54	0.54	---	---
	4.000	24.0	340225	T/4, W/4	0.94	0.94	0.96	0.96	1.02	1.01	0.58	0.58	1.02	1.01	0.58	0.58	0.58	0.58	0.56	0.56
				T/2, W/2	0.97	0.97	1.00	1.00	1.02	1.02	0.56	0.56	1.02	1.02	0.56	0.56	0.56	0.56	---	---
					0.93	0.93	1.00	1.00	1.01	1.01	0.56	0.56	1.01	1.01	0.56	0.56	0.56	0.56	0.54	0.54
6061-T6510	0.050	0.42	318136†	T/2	0.98	0.98	0.95	0.95	0.98	0.99	0.72	0.72	0.98	0.99	0.72	0.72	0.72	0.72	---	---
	0.075	0.59	317857	T/2	0.97	0.97	0.93	0.93	0.96	0.99	0.65	0.65	0.96	0.99	0.65	0.65	0.65	0.65	---	---
	0.090	0.27	318021†	T/2	0.97	0.97	0.93	0.93	0.96	1.00	0.76	0.76	0.96	1.00	0.76	0.76	0.76	0.76	---	---
	0.123	0.61	317846	T/2	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	0.126	0.30	317847	T/2	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	0.250	0.36	317848	T/2	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	0.310	6.3	317905	T/2	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	0.315	5.8	317953	T/2	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	0.375	8.6	317927	T/2	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	0.375	7.7	318083	T/2	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	0.918	1.3	317906	T/2, W/2	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	1.240	2.7	317937	T/2, W/4	0.97	0.97	0.93	0.93	0.96	1.00	0.72	0.72	0.96	1.00	0.72	0.72	0.72	0.72	---	---
	1.960	4.4	317896	T/2, W/4	0.89	0.89	0.86	0.86	0.96	0.94	0.60	0.60	0.96	0.94	0.60	0.60	0.60	0.60	---	---
	3.000	15.0	340226	T/2, W/4	0.87	0.87	0.83	0.83	0.96	0.91	0.57	0.57	0.96	0.91	0.57	0.57	0.57	0.57	---	---
	6.500	33.2	317897	T/2, W/2	0.80	0.80	0.82	0.82	0.96	0.88	0.53	0.53	0.96	0.88	0.53	0.53	0.53	0.53	0.55	0.55
7075-T6510	0.065	0.18	317889	T/2	0.97	0.97	0.96	0.96	0.95	1.00	0.52	0.52	0.95	1.00	0.52	0.52	0.52	0.52	---	---
	0.065	0.27	318031†	T/2	0.97	0.97	0.96	0.96	0.95	1.00	0.52	0.52	0.95	1.00	0.52	0.52	0.52	0.52	---	---
	0.080	0.18	317858	T/2	0.97	0.97	0.96	0.96	0.95	1.00	0.52	0.52	0.95	1.00	0.52	0.52	0.52	0.52	---	---
	0.133	0.97	318029†	T/2	0.98	0.98	0.96	0.96	1.01	1.03	0.53	0.53	1.01	1.03	0.53	0.53	0.53	0.53	---	---

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T3511 temper
§ Sample was in the T6511 temper

TABLE XII (Continued)

TABLE XII
(Concluded)

RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF STRESS-RELIEVED STRETCHED ALUMINUM ALLOY EXTENSIONS

[AF33(615)-3580]

[illegible]

* T - Thickness; W - Width
 † Producer B; all others from Producer A
 ‡ Samples were in the T35ll temper
 § Sample was in the T85ll temper

TABLE XIII
RATIOS AMONG THE TENSILE, COMPRESSIVE AND SHEAR PROPERTIES
OF ALUMINUM ALLOY EXTRUSIONS IN THE "HEAT-TREATED-BY-USER" TEMPER
[AF33(615)-3580]

Alloy and Temper	Sample			TTS (LT)		TTS (ST)		TTS (IT)		TTS (ST)		CYS (LT)		CYS (IT)		CYS (ST)		SU (LT)		SU (ST)	
	Section Thickness, in.	Gross-Sectional Area, in. ²	Number	Location*	TTS (LT)	TTS (L)	TTS (ST)	TTS (L)	TTS (L)	TTS (ST)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)	TTS (L)
2014-T62	0.300	6.3	318084	T/2	1.01	--	--	0.94	--	--	--	1.04	1.08	--	--	--	--	0.58	0.56	--	--
	0.499	1.4	318085	T/2	0.98	--	--	0.98	--	--	--	1.06	1.03	--	--	--	--	0.65	--	--	--
2024-T42	0.064	0.27	318088†	T/2	1.06	--	--	0.98	--	--	--	1.01	1.07	--	--	--	--	--	--	--	--
	0.083	0.27	318086	T/2	1.02	--	--	1.02	--	--	--	1.06	1.06	--	--	--	--	--	--	--	--
	0.430	2.1	340241†	T/2	1.00	--	--	0.99	--	--	--	1.01	1.06	--	--	--	--	0.54	0.52	--	--
	0.500	0.64	340243	T/2	0.90	--	--	0.87	--	--	--	1.01	--	--	--	--	--	0.49	--	--	--
	2.562	6.4	340245	T/4, W/4	0.85	--	--	0.81	--	--	--	1.00	0.85	--	--	--	--	0.50	--	--	--
				T/2, W/2	0.76	0.79	0.78	0.80	--	--	--	1.01	0.84	0.84	--	--	--	0.48	0.48	0.52	--
2024-T62	0.064	0.27	318089†	T/2	1.06	--	--	1.01	--	--	--	0.99	1.05	--	--	--	--	--	--	--	--
	0.085	0.27	318087	T/2	1.03	--	--	0.98	--	--	--	1.07	1.03	--	--	--	--	--	--	--	--
	0.430	2.1	340242†	T/2	0.99	--	--	1.00	--	--	--	1.04	--	--	--	--	--	0.57	0.55	--	--
	0.500	0.64	340244	T/2	0.95	--	--	0.98	--	--	--	1.02	--	--	--	--	--	0.56	--	--	--
	2.562	6.4	340246	T/4, W/4	0.93	--	--	0.95	--	--	--	1.04	1.01	--	--	--	--	0.56	--	--	--
				T/2, W/2	0.91	0.93	0.96	0.96	--	0.96	--	1.04	1.00	1.03	--	--	--	0.56	0.54	0.57	--
6061-T62	0.246	4.6	318090	T/2	0.96	--	--	0.95	--	--	--	1.03	1.00	--	--	--	--	0.74	0.73	--	--
	1.625	3.9	313091	T/4, W/4 T/2, W/2	0.98 0.99	--	--	0.96 0.97	--	--	--	1.03 1.03	-- 1.04	--	--	--	--	0.70 0.71	-- 0.68	--	--
7075-T62	0.063	0.34	318094†	T/2	0.98	--	--	0.99	--	--	--	1.06	1.09	--	--	--	--	--	--	--	--
	0.126	0.17	318092	T/2	--	--	--	0.93	--	--	--	1.06	--	--	--	--	--	--	--	--	--
	0.300	1.7	318036	T/2	0.93	--	--	0.93	--	--	--	1.02	1.03	--	--	--	--	0.54	0.52	--	--
	1.225	21.2	318098†	T/2, W/4 T/2, W/2	0.95 0.95	--	--	0.95 0.95	--	--	--	1.05 1.03	1.02 1.03	--	--	--	--	0.55 0.53	0.53 0.52	--	--
	2.250	4.1	318100	T/4 T/2	-- 0.86	--	--	-- 0.81	--	--	--	1.02 1.02	-- 0.88	--	--	--	--	0.53 0.53	-- 0.52	--	--
					0.99	--	--	0.96	--	--	--	1.03	1.06	--	--	--	--	--	--	--	--
7075-T73X	0.063	0.34	318095†	T/2	0.99	--	--	0.96	--	--	--	1.03	1.06	--	--	--	--	--	--	--	--
	0.126	0.17	318093	T/2	--	--	--	--	--	--	--	0.97	--	--	--	--	--	--	--	--	--
	0.300	1.7	318097	T/2	0.97	--	--	0.96	--	--	--	1.07	1.02	--	--	--	--	0.57	0.55	--	--
	1.225	21.2	318099†	T/2, W/4 T/2, W/2	0.94 0.96	--	--	0.95 0.97	--	--	--	1.06 1.03	1.02 1.03	--	--	--	--	0.57 0.57	0.53 0.56	--	--
7178-T62	2.250	4.1	318101	T/4 T/2	-- 0.93	--	--	-- 0.89	--	--	--	1.02 1.03	1.03 0.94	--	--	--	--	0.57 0.56	0.57 0.57	--	--
					0.93	--	--	0.89	--	--	--	1.03	0.94	--	--	--	--	0.56	0.57	--	--
	0.050	0.15	340247	T/2	--	--	--	--	--	--	--	1.09	--	--	--	--	--	--	--	--	--
	0.031	0.20	318102†	T/2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7178-T62	0.403	3.0	340249	T/2	--	--	--	--	--	--	--	--	--	--	--	--	--	0.53	0.51	--	--

* T - Thickness; W - Width
† Producer B; all others Producer A

TABLE XIII

TABLE XIV
RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED
ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-758g]

Alloy and Temper	Sample			Flatwise						Edge-wise					
	Section Thick-ness, in.	Gross Area, in. ²	Thick-ness, in.	Number	Loca-tion*	Bearing			Tensile			Bearing			Tensile
						BRS (L) TYS (L)	BRS (LT) TYS (LT)	BRS (LT) TYS (LT)	BRS (L) TYS (L)	BRS (LT) TYS (LT)	BRS (LT) TYS (LT)	BRS (L) TYS (L)	BRS (LT) TYS (LT)	BRS (LT) TYS (LT)	BRS (LT) TYS (LT)
2014-T6510	0.061	0.30	317950		T/2	1.57	2.07	1.42	1.67	1.42	1.67	1.57	2.07	1.42	1.67
	0.070	0.24	318017†		T/2	1.61	2.08	1.43	1.68	1.43	1.68	1.61	2.08	1.43	1.68
	0.246	0.45	318130		T/2	1.72	2.14	1.56	1.78	1.56	1.78	1.72	2.14	1.56	1.78
	0.250	3.7	340154		T/2	1.68	2.18	1.50	1.83	1.50	1.83	1.68	2.18	1.50	1.83
	0.271	0.40	317994		T/2	1.58	2.07	1.46	1.69	1.46	1.69	1.58	2.07	1.46	1.69
	0.750	1.4	317924		T/2	1.42	1.86	1.32	1.49	1.32	1.49	1.42	1.86	1.32	1.49
	1.657	2.2	318046		T/4	1.46	1.87	1.33	1.56	1.33	1.56	1.46	1.87	1.33	1.56
					T/2	1.45	1.81	1.29	1.50	1.29	1.50	1.45	1.81	1.29	1.50
	0.075	0.70	318132†		T/2	1.47	1.81	1.48	1.78	1.48	1.78	1.47	1.81	1.48	1.78
	0.094	0.30	318019†		T/2	1.52	2.00	1.48	1.75	1.48	1.75	1.52	2.00	1.48	1.75
2024-T3510	0.101	0.33	317885		T/2	1.51	1.86	1.43	1.69	1.43	1.69	1.51	1.86	1.43	1.69
	0.106	0.31	317904		T/2	1.59	1.95	1.49	1.76	1.49	1.76	1.59	1.95	1.49	1.76
	0.120	0.27	318018†		T/2	1.52	1.88	1.48	1.71	1.48	1.71	1.52	1.88	1.48	1.71
	0.151	0.82	317886		T/2	1.46	1.77	1.44	1.68	1.44	1.68	1.46	1.77	1.44	1.68
	0.258	4.2	317942		T/2	1.25	1.56	1.21	1.38	1.21	1.38	1.25	1.56	1.21	1.38
	0.375	0.62	318047		T/2	1.33	1.68	1.34	1.68	1.34	1.68	1.33	1.68	1.34	1.68
	0.510	10.1	317943		T/2	1.67	2.09	1.61	2.06	1.61	2.06	1.67	2.09	1.61	2.06
	0.525	1.9	318020†		T/2, W/2	1.32	1.73	1.36	1.66	1.36	1.66	1.32	1.73	1.36	1.66
	0.550	1.9	317856		T/2, W/4	1.63	1.90	1.53	1.81	1.53	1.81	1.63	1.90	1.53	1.81
	0.642	5.8	317945		T/2, W/4	1.31	1.66	1.27	1.52	1.27	1.52	1.31	1.66	1.27	1.52
*	0.950	4.6	317944		T/2, W/4	1.27	1.63	1.22	1.49	1.22	1.49	1.27	1.63	1.22	1.49
	1.150	5.6	318077		T/2, W/4	1.32	1.69	1.27	1.56	1.27	1.56	1.32	1.69	1.27	1.56
					T/2, W/2	1.35	1.69	1.27	1.58	1.27	1.58	1.35	1.69	1.27	1.58
	1.200	3.9	317946		T/2, W/4	1.31	1.67	1.24	1.49	1.24	1.49	1.31	1.67	1.24	1.49
	1.450	7.3	318021†		T/2, W/4	1.31	1.64	1.26	1.50	1.26	1.50	1.31	1.64	1.26	1.50
					T/2, W/2	1.31	1.65	1.26	1.54	1.26	1.54	1.31	1.65	1.26	1.54
	1.705	4.8	340213		T/2, W/4	1.34	1.65	1.23	1.50	1.23	1.50	1.34	1.65	1.23	1.50
					T/2, W/2	1.32	1.62	1.25	1.50	1.25	1.50	1.32	1.62	1.25	1.50
	2.520	8.8	318133†		T/2, W/4	1.28	1.59	1.25	1.53	1.25	1.53	1.28	1.59	1.25	1.53
	4.000	24.0	340214		T/2, W/4	1.26	1.64	1.24	1.54	1.24	1.54	1.26	1.64	1.24	1.54
*	2.760	29.6	318048		T/2, W/2	1.18	1.65	1.27	1.54	1.27	1.54	1.18	1.65	1.27	1.54
					T/2, W/4	1.22	1.53	1.25	1.50	1.25	1.50	1.22	1.53	1.25	1.50
					T/2, W/2	1.28	1.61	1.30	1.59	1.30	1.59	1.28	1.61	1.30	1.59
					T/2, W/4	1.22	1.53	1.25	1.50	1.25	1.50	1.22	1.53	1.25	1.50
					T/2, W/2	1.22	1.53	1.25	1.50	1.25	1.50	1.22	1.53	1.25	1.50
					T/2, W/4	1.22	1.53	1.25	1.50	1.25	1.50	1.22	1.53	1.25	1.50
					T/2, W/2	1.22	1.53	1.25	1.50	1.25	1.50	1.22	1.53	1.25	1.50
					T/2, W/4	1.22	1.53	1.25	1.50	1.25	1.50	1.22	1.53	1.25	1.50
					T/2, W/2	1.22	1.53	1.25	1.50	1.25	1.50	1.22	1.53	1.25	1.50
					T/2, W/4	1.22	1.53	1.25	1.50	1.25	1.50	1.22	1.53	1.25	1.50

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T3511 tempers
§ Sample was in the T6511 temper

** Bearing specimen failed before reaching yield stress (2 per cent offset).
NOTE: L - Longitudinal; LT - Long-Transverse

TABLE XIV (Continued)
RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED
ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

[illegible]

* T - Thickness; W - Width
† Producer B; all others from Producer A
‡ Samples were in the T9511 temper
§ Sample was in the T8511 temper

** Bearing specimen failed before reaching yield stress (2 per cent offset).

NOTE: L - Longitudinal; LT - Long-Transverse

TABLE XIV (Concluded)
RATIOS OF BEARING TO TENSILE PROPERTIES OF STRESS-RELIEVED STRETCHED
ALUMINUM ALLOY EXTRUSIONS
[AF33(615)-3580]

Alloy and Temper	Section Thickness, in.	Gross Area, in. ²	Number	Location	Flatwise				Edge-wise			
					BYS (L) TUS (L)	BYS (IT) TUS (IT)	BYS (L) TUS (L)	BYS (IT) TUS (IT)	BYS (L) TUS (L)	BYS (IT) TUS (IT)	BYS (L) TUS (L)	BYS (IT) TUS (IT)
					e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0	e/D=1.5 e/D=2.0
7075-T6510	0.065	0.18	317899	T/2	1.46	1.82	1.35	1.55	--	--	--	--
	0.065	0.27	318031+	T/2	1.48	1.86	1.32	1.61	--	--	--	--
	0.080	0.18	317858	T/2	1.42	1.81	1.34	1.53	--	--	--	--
	0.123	0.97	318030+	T/2	1.48	1.86	1.41	1.93	--	--	--	--
	0.160	0.26	317954	T/2	1.45	1.85	1.37	1.62	--	--	--	--
	0.260	2.2	318028+	T/2	1.47	1.82	1.35	1.58	--	--	--	--
	0.375	7.2	317954	T/2	1.42	1.82	1.29	1.59	--	--	--	--
	0.438	7.2	317859	T/2	1.47	1.83	1.41	1.60	1.50	1.75	1.40	1.67
	0.463	7.2	318032+	T/2	1.45	1.85	1.30	1.56	1.47	1.79	1.32	1.61
	0.935	7.2	340155	T/2, W/4	1.46	1.82	1.33	1.56	--	--	--	--
	1.023	1.8	318033	T/2, W/4	1.37	1.77	1.21	1.49	--	--	--	--
	1.188	27.1	317860	T/2, W/2	1.47	1.84	1.36	1.52	1.49	1.83	1.40	1.61
	1.500	1.8	317955	T/2	1.31	1.67	1.18	1.40	1.51	1.88	1.42	1.64
	2.000	3.1	317861	T/4	1.36	1.76	1.25	1.46	--	--	--	--
	2.190	17.0	318137+	T/4, W/4	1.44	1.71	1.38	1.64	1.43	1.78	1.37	1.64
7075-T73510	0.080	0.18	317862	T/2	1.52	1.94	1.45	1.69	--	--	--	--
	0.275	2.2	317900	T/2	1.51	1.95	1.44	1.70	--	--	--	--
	0.438	7.2	317910	T/2	1.53	1.98	1.47	1.74	1.54	1.98	1.45	1.78
	1.500	1.8	317956	T/2	1.39	1.83	1.30	1.55	--	--	--	--
	2.000	3.1	317948	T/4	1.41	1.85	1.28	1.54	--	--	--	--
				T/2	1.44	1.85	1.31	1.56	--	--	--	--
7079-T6510	0.161	0.72	340252	T/2	1.44	1.81	1.34	1.55	--	--	--	--
	0.251	0.82	340253	T/2	1.46	1.82	1.33	1.50	--	--	--	--
7178-T6510	0.063	0.37	317902	T/2	1.40	1.77	1.31	1.55	--	--	--	--
	0.142	1.0	318016	T/2	1.41	1.79	1.32	1.58	--	--	--	--
	0.154	0.42	318035+	T/2	1.50	1.87	1.40	1.61	--	--	--	--
	0.162	0.49	317902	T/2	1.44	1.79	1.34	1.52	--	--	--	--
	0.265	0.88	317956	T/2	1.39	1.75	1.26	1.40	--	--	--	--
	0.780	1.7	340254	T/2, W/4	1.38	1.73	1.19	1.43	--	--	--	--
	0.625	6.9	317997	T/2, W/2	1.46	1.76	1.32	1.55	1.41	1.69	1.31	1.54
	1.200	3.9	318139+	T/2, W/2	1.41	1.80	1.32	1.51	--	--	--	--
				T/2, W/4	1.42	1.76	1.28	1.54	1.29	1.70	1.30	1.52
				T/2	1.49	1.78	1.31	1.56	1.31	1.71	1.31	1.56
7178-T6510	1.438	6.4	317957	T/4	1.31	1.65	1.21	1.44	--	--	--	--
	2.180	15.5	318140+	T/4, W/4	1.37	1.77	1.36	1.61	1.41	1.71	1.37	1.62
				T/2, W/2	1.38	1.80	1.39	1.63	1.40	1.78	1.36	1.62

* T - Thickness; W - Width
 + Producer B; all others from Producer A
 † Samples were in the T6511 temper
 ‡ Sample was in the T6511 temper
 ** Bearing specimen failed before reaching yield stress (2 per cent offset).
 NOTE: L - Longitudinal; IT - Long-Transverse

TABLE XIV (Concluded)

RATIOS OF HEARING TO TENSILE PROPERTIES OF ALUMINUM ALLOY EXTENSIONS IN THE "HEAT-TREATED-BY-USER" TEMPER

[illegible]

* T - Thickness; W - Width
† Producer B; all others from Producer A

NOTE: L - Longitudinal; LT - Long-Transverse

TABLE XVI
RATIOS AMONG THE MECHANICAL PROPERTIES AT DIFFERENT LOCATIONS
[AF33(615)-3580]

Alloy and Temper	Sample			Direction*	Location†	Tensile Ultimate Stress Stress-Relieved Extrusions W/2, TW/4	Compressive Yield Stress	Shear Ultimate Stress	Bearing	
	Section Thickness, in.	Gross-Sectional Area, in. ²	Number						Ultimate Stress e/1.5 e/2.0 e/1.5 e/2.0	Yield Stress e/1.5 e/2.0 e/1.5 e/2.0
2014-T6510	1.657	2.2	318146	L	W/2, W/4	1.01 1.01	1.01	1.00	0.99 0.98 0.97 0.97	0.97 0.97
2024-T3510	0.525	1.9	318020**	L	W/2, W/4	0.99 1.00	1.03	0.98	-- --	-- --
	1.150	5.6	318077	L	W/2, W/4	1.03 0.96	0.94	1.01	0.99 1.01	0.97 0.98
	1.450	7.3	318021**	L	W/2, W/4	1.01 0.97	0.99	0.99	0.99 0.98	0.99 0.98
	1.705	4.8	340213	L	TW/2, TW/4	1.01 1.00	1.01	0.96	0.99* 0.97*	0.97* 0.99*
	2.520	8.8	318133**	L	TW/2, TW/4	0.99 1.02	1.02	--	0.98 0.98	1.00 0.97
	4.000	24.0	340214	L	TW/2, TW/4	1.00 0.96	0.98	0.99	0.99 0.97*	1.01 0.99*
	2.760	29.6	318048	L	TW/2, TW/4	0.98 1.00	1.00	0.96	1.03 1.05	1.04 1.06
	0.525	1.9	318024**	L	W/2, W/4	1.03 0.98	1.04	1.01	0.99 0.97	1.02* 1.00
	1.150	5.6	318078	L	W/2, W/4	0.99 1.00	0.99	0.99	-- --	-- --
	1.450	7.3	318025	L	W/2, W/4	1.00 1.00	0.98	1.00	0.99 1.00	0.99 1.00
6061-T6510	1.705	4.8	340169	L	TW/2, TW/4	1.01 1.02	1.00	0.98	1.01 1.02	1.01* 1.03
	2.760	29.6	318079	L	TW/2, TW/4	1.00 1.01	0.99	1.00	1.01 1.02	1.01* 1.03
	4.000	24.0	340225	L	TW/2, TW/4	1.01 1.02	0.98	0.98	1.05 1.01	0.98 0.98
	1.240	2.7	317907	L	W/2, W/4	1.01 1.01	0.98	0.99	0.99 1.00	0.97 0.97
	1.560	4.4	317896	L	W/2, W/4	1.01 1.01	1.02	0.98	0.99 0.99	0.99 0.99
	3.000	15.0	340226	L	TW/2, TW/4	0.98 0.98	0.97	1.00	0.98* 0.98*	0.97* 0.96*
	1.705	4.8	340169	L	TW/2, TW/4	1.01 1.02	0.98	0.97	1.05 1.01	0.98 0.98
	2.760	29.6	318079	L	TW/2, TW/4	1.00 1.01	0.99	1.00	1.01 1.02	1.01* 1.03
	4.000	24.0	340225	L	TW/2, TW/4	1.01 1.02	0.98	0.98	1.05 1.01	0.98 0.98
	1.240	2.7	317907	L	W/2, W/4	1.01 1.01	0.98	0.99	0.99 1.00	0.97 0.97

* L - Longitudinal; LT - Long-Transverse
† T - Thickness; W - Width
* Edgewise bearing specimens; others - Flatwise specimens
** Producer B; all others from Producer A
†† Sample was in the T3511 temper
** Sample was in the T6511 temper

TABLE XVI (Concluded)
RATIOS AMONG THE MECHANICAL PROPERTIES AT DIFFERENT LOCATIONS
[AF33(615)-3580]

Alloy and Temper	Section Thickness, in.	Sample Gross-Sectional Area, in. ²	Number	Direction*	Location†	Tensile Ultimate Stress	Tensile Yield Stress	Compressive Yield Stress	Shear Ultimate Stress	Bearing	
										Ultimate Stress $\sigma/\sigma_{T=2.0}$	Yield Stress $\sigma/\sigma_{T=2.0}$
6061-T6510	6.500	33.2	317897	L LT	T/2, W/4	0.99 0.99	0.99 0.97	0.99 0.97	0.99 0.99	0.98 --	0.99 0.95
	0.935	7.2	340155	L LT	W/2, W/4	0.98 0.99	0.97 0.98	0.97 0.98	0.99 0.94	0.98 0.99	0.97 0.98
	1.188	27.1	317860	L LT	W/2, W/4	0.98 0.98	0.98 0.98	0.97 0.98	0.99 0.99	0.98 0.99	0.98 0.98
	2.000 2.190	3.1 17.0	317861 318137**	L LT	T/2, T/4 TW/2, TW/4	0.98 0.97	0.96 0.96	0.98 0.95	0.97 0.96	0.98 0.98	0.97 0.97
7075-T6510	3.040	13.8	318138**	L LT	TW/2, TW/4	1.03 0.97	0.99 0.97	0.96 0.96	0.95 0.98	1.03 0.99	0.98 0.97
	0.935	7.2	340292	L LT	W/2, W/4	0.98 0.99	0.98 0.99	0.97 0.98	0.98 0.99	0.98 0.98	0.97 0.97
	2.000	3.1	317948	L	T/2, T/4	0.98 0.99	0.98 0.98	0.98 0.98	0.98 0.99	1.01 0.98	1.02 1.00
	0.625	6.9	317997	L LT	W/2, W/4	0.98 0.98	0.99 0.99	0.98 0.98	1.00 1.01	0.98 1.00	0.99 0.98
7178-T6510	1.200	3.9	318139**	L LT	W/2, W/4	0.98 0.98	0.99 0.99	0.98 0.98	0.99 0.99	1.00 0.99	0.98 0.98
	2.180	15.5	318140**	L LT	TW/2, TW/4	0.99 0.97	0.99 0.95	0.96 0.96	0.99 0.99	0.99 0.94	0.97 0.96
	1.562	6.4	340245	L LT	W/2, W/4	0.99 0.88	0.97 0.96	0.97 0.95	0.96 0.95	0.98 0.94	0.97 1.00
	1.552	6.4	340246	L LT	WT/2, WT/4	0.95 0.94	0.93 0.93	0.94 0.92	0.96 0.92	0.94 1.00	0.97 1.01
6061-T62	1.625	3.9	318091	L LT	WT/2, WT/4	1.00 1.01	1.01 1.02	1.00 --	1.02 --	1.01 --	1.03 0.99
7075-T62	1.225	2.2	318098	L LT	W/2, W/4	0.97 0.99	0.96 0.96	0.96 0.96	0.99 0.99	0.98 1.02	0.98 1.01
7075-T73	2.250	4.1	318100	L LT	T/2, T/4	0.99 0.96	0.99 0.96	0.97 0.95	0.99 0.97	0.96 0.96	0.97 0.96
	2.225	2.2	318099	L LT	W/2, W/4	0.97 0.99	0.96 0.99	0.96 0.97	0.98 0.98	1.01 1.03	0.99 1.02
2.250	4.1	318101	L	T/2, T/4		0.94 0.93	0.99 0.93	0.97 0.94	0.98 0.93	0.95 0.96	0.96 0.94

Extruded in the "Heat-Treated-by-User" condition

* L - Longitudinal; LT - Long-Transverse
† T - Thickness; W - Width
‡ Edgewise bearing specimens; others - flatwise specimens
** Producer B; all others from Producer A
†† Sample was in the T7511 temper
‡‡ Sample was in the T6511 temper

TABLE XVII
RATIOS OF BEARING PROPERTIES IN THE EDGEWISE DIRECTION TO THOSE IN THE
FLATWISE DIRECTION FOR ALUMINUM ALLOY EXTRUSIONS

[A733(615)-3580]

Alloy and Temper	Sample				Alloy and Temper	Sample				Edge-wise/Flatwise		Edge-wise/Flatwise			
	Section Thickness, in.	Cross-sectional Area, in. ²	Number	Location*		Direction†	EWS(E)/EWS(F) e/D=1.5 e/D=2.0	EWS(F)/EWS(P) e/D=1.5 e/D=2.0	Section Thickness, in.	Cross-sectional Area, in. ²	Number	Location*	Direction†	EWS(E)/EWS(F) e/D=1.5 e/D=2.0	EWS(F)/EWS(P) e/D=1.5 e/D=2.0
2024-T6510 ††	Stress-Relieved Stretched Extrusions														
	1.150	5.6	318077	T/2, W/4	L	0.91	0.97	1.188	27.1	317860	T/2, W/4	L	0.86	0.93	0.90
	1.200	7.9	317846	T/2, W/4	L	0.97	0.98					IT	0.87	0.90	0.89
	1.450	7.3	318021*	T/2, W/4	L	0.97	0.99				T/2, W/2	L	0.88	0.95	1.00
	1.705	4.8	340213	T/2, W/2	L	0.97	0.98	2.100	17.0	318137*	T/4, W/4	L	0.90	0.92	0.92
	2.520	8.8	318133*	T/2, W/4	L	0.97	1.00				T/4, W/4	IT	0.86	0.93	0.90
	4.000	24.0	340214	T/4, W/4	L	0.92	0.88				T/2, W/2	L	0.82	0.88	0.86
				T/4, W/4	IT	0.90	0.88	3.040	13.8	318138*	T/4, W/4	L	0.85	0.89	0.83
	2.760	29.1	318048	T/2, W/2	L	0.97	0.95				T/2, W/2	IT	0.96	0.96	0.91
				T/4, W/4	IT	1.01	0.99				T/4, W/4	L	0.98	0.98	0.95
2024-T6510 **	1.150	5.6	318078	T/2, W/4	L	0.87	0.93	1.200	3.9	318139*	T/4, W/4	L	0.93	0.97	1.02
	1.200	7.9	317895	T/2, W/4	L	0.95	0.97	2.180	15.5	318140*	T/2, W/2	L	0.90	0.96	1.03
	1.450	7.3	318025*	T/2, W/4	L	0.96	0.96				T/4, W/4	L	0.85	0.90	0.98
	1.705	4.8	340169	T/2, W/2	L	0.99	0.95				T/2, W/2	IT	0.89	0.95	0.92
	2.760	29.1	318079	T/4, W/4	L	1.07	1.00				T/2, W/2	L	0.83	0.91	0.96
				T/4, W/4	IT	1.03	1.02	Extrusions in the Heat-Treated-by-User Tempers							
	4.000	24.0	340225	T/2, W/2	L	0.95	0.96	2.562	6.4	340245	T/4, W/4	L	0.94	0.99	0.94
				T/4, W/4	L	0.89	0.84				T/2, W/2	L	0.94	0.97	0.96
				T/2, W/2	L	0.92	0.85	2.562	6.4	340246	T/4, W/4	L	0.95	0.96	0.96
											T/2, W/2	L	1.01	0.96	1.02
6061-T6510	1.240	2.7	317907	T/2, W/2	L	0.99	0.98	1.625	3.9	318091	T/2, W/2	L	0.98	0.99	0.98
	1.360	4.4	317896	T/2, W/2	L	0.99	1.00	1.225	21.2	318098	T/2, W/4	L	0.88	0.94	0.96
	3.000	15.0	340226*	T/4, W/4	L	1.02	0.98	2.250	4.1	318100	T/2, W/2	L	0.90	0.92	1.02
				T/4, W/4	IT	0.97	0.98				T/4	IT	0.87	0.91	0.94
	6.500	33.2	317897	T/2, W/2	L	0.98	0.97	1.225	21.2	318099	T/4	L	1.02	1.01	1.00
				T/4	L	1.00	0.97				T/2, W/4	L	1.02	1.02	1.02
						0.99	0.99	2.250	4.1	318101	T/2, W/2	L	0.94	0.94	0.96
						0.97	0.97				T/2, W/2	IT	0.86	0.91	0.96
						0.99	0.99				T/4	IT	0.89	0.91	0.99
						0.97	0.97	2.250	4.1	318102	T/4	L	0.97	0.97	0.99

* T - Thickness; W - Width
† L - Longitudinal; IT - Long-Transverse
* Producer B; all others from Producer A
** Bearing specimen failed before reaching yield stress (2 per cent offset).
†† Sample was in the T3511 temper
** Sample was in the T6511 temper

TABLE XVIII

RESULTS OF FRACTURE TOUGHNESS TESTS OF SINGLE-EDGE-NOTCHED SPECIMENS
OF ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3586]

Alloy and Temper	Sample		Specimen				Nature of pop-in. Indication†	Original Crack Length(a _o),* in.	Gross Stress(σ), # psi		Net Stress σ _n , psi**		K _{IC} †† psi√in. in.-lb/in. ²		
	Section Thickness, in.	Cross-Sectional Area, in. ²	Direction* and Specimen No.	Type (See Fig. 1)	Width(w) in.	Thickness,(B) in.			Load,(P) lb	Stress(σ), # psi	#	σ _n , psi**	psi√in.	in.-lb/in. ²	Gr _C
2014-T6510	0.271	0.40	317994	L1	2	1.502	0.271	I	4 600	0.52	11 300	44 700	0.70	27 300	70
				L1	2	1.502	0.271	S	5 100	0.52	12 500	49 600	0.78	30 400	86
				L1	2	1.502	0.271	P	4 950	0.51	12 200	46 900	0.73	28 700	77
	0.255	2.8	317890	L1	2	1.502	0.219	S	5 100	0.51	12 500	48 300	0.76	29 600	82
				L1	2	1.502	0.219	I	3 600	0.52	10 900	43 300	0.61	26 200	64
				L2	2	1.502	0.219	S	3 780	0.52	11 500	45 500	0.64	27 600	71
2024-T6510	0.510	10.1	317892	T1	1	0.937	0.199	I	3 500	0.53	10 600	43 400	0.61	26 200	76
				T2	1	0.939	0.200	S	3 790	0.53	11 500	47 000	0.66	28 500	76
				T1	1	0.937	0.199	P	2 060	0.33	11 000	44 900	0.62	21 400	43
				T2	1	0.939	0.200	S	2 060	0.33	11 000	44 900	0.62	21 400	43
				L1	3	2.250	0.500	P	1 920	0.35	10 200	45 400	0.63	21 500	43
				L2	3	2.250	0.500	S	1 940	0.35	10 300	45 800	0.63	21 700	44
	0.642	5.8	317894	L1	3	2.250	0.500	P	10 375	0.78	9 200	36 600	0.55	27 000	68
				L2	3	2.250	0.500	S	10 100	0.78	9 000	35 600	0.53	26 300	65
				L1	4	3.000	0.627	I	9 750	0.78	8 700	34 381	0.52	25 300	60
				L2	4	3.000	0.613	S	9 750	0.78	8 700	34 381	0.52	25 300	60
				L1	4	3.000	0.627	I	12 625	1.01	6 700	25 500	0.37	21 700	44
				L2	4	3.000	0.613	S	13 125	1.01	7 000	26 500	0.38	22 600	46
2024-T6510	1.450	7.3	318025**	T1	1	0.938	0.217	P	12 375	0.99	7 000	24 900	0.36	21 200	42
				T2	1	0.938	0.217	S	12 950	0.99	7 000	26 000	0.38	22 200	46
				L1	4	3.000	1.010	I	1 620	0.34	8 000	33 800	0.50	15 900	24
				L2	4	3.000	1.010	S	1 680	0.34	8 300	35 000	0.52	16 500	26
				L1	4	3.000	1.010	I	25 400	1.02	8 400	32 300	0.47	27 500	71
				L2	4	3.000	1.010	S	27 600	1.02	8 100	35 100	0.51	30 000	74
	2.760	29.6	319079	T1	1	0.937	0.373	S, M	27 300	1.01	9 000	34 300	0.50	29 300	72
				T2	1	0.935	0.377	S, M	3 310	0.33	9 500	38 500	0.50	16 300	31
				T1	1	0.937	0.374	I	3 570	0.31	10 100	37 700	0.57	18 100	31
				T2	1	0.937	0.374	S, M	3 125	0.37	8 900	34 600	0.57	16 600	26
				T1	2	1.501	0.500	I	4 800	0.58	6 400	30 100	0.49	17 300	22
				T2	2	1.501	0.495	S	4 875	0.58	6 500	30 600	0.50	17 500	22
4.000	24.0	340225	T1	2	1.501	0.495	S	5 600	0.52	7 500	29 600	0.48	17 500	30	
			T2	2	1.501	0.495	M	5 625	0.52	7 500	29 800	0.48	17 500	30	

TABLE XVIII

TABLE XVIII (Continued)
RESULTS OF FRACTURE TOUGHNESS TESTS OF SINGLE-EDGE-NOTCHED SPECIMENS
OF ALUMINUM ALLOY EXTRUSIONS

[AF33(615)-3589]

Alloy and Temper	Sample			Direction* and Specimen No.	Specimen			Nature of pop-in Indication†	Original Crack Length(a ₀), in.	Gross Stress(σ), #/in. ²	Net Stress σ _n , psi**	K _{IC} , ksi√in.	K _{IC} , lb/√in.	G _{IC} , lb/in. ^{3/2}				
	Section Thickness, in.	Cross-sectional Area, in. ²	Number		Type (See Fig. 1)	Width(W) in.	Thickness, (B) in.											
7075-T6510	0.438	7.2	317859	L1	4	3.000	0.390	P	9 250	1.03	7 900	30 900	0.39	26 200	66			
				L2	4	3.000	0.401	S	9 350	1.03	8 000	31 300	0.39	26 500	68			
								I	9 125	1.06	7 600	31 000	0.39	26 100	66			
								S	10 150	1.06	8 400	34 400	0.43	29 100	81			
				T1	3	2.250	0.390	P	7 300	0.86	8 300	28 500	0.50	27 800	74			
				T2	3	2.250	0.390	S	7 300	0.86	8 300	28 500	0.50	27 800	74			
	1.188	27.1	318137	L1	4	3.000	1.010	I	25 300	1.00	8 300	31 300	0.41	26 700	68			
				L2	4	3.000	1.010	S	26 200	1.00	8 600	32 400	0.43	27 700	74			
								I	25 400	1.00	8 400	31 400	0.41	26 800	69			
								S	27 200	1.00	9 000	33 700	0.44	28 700	79			
				T1	2	1.501	0.501	P	7 450	0.51	9 900	38 200	0.55	23 100	51			
				T2	2	1.500	0.500	S, M	7 500	0.51	10 000	38 400	0.56	23 300	52			
3.040	13.8	318138**	T1	1	0.939	0.375	I	3 750	0.32	10 600	40 900	0.61	19 000	37				
			T2	1	0.939	0.376	S, M	4 250	0.32	12 000	46 300	0.63	20 400	46				
							I	3 800	0.34	10 600	45 600	0.63	21 400	46				
							S	3 830	0.34	10 800	46 000	0.69	20 600	46				
			7075-T73510	0.438	7.2	317910	L1	4	3.000	0.395	I	12 750	1.03	10 800	42 100	0.62	36 100	125
							L2	4	3.000	0.400	S	12 750	1.03	10 800	42 100	0.62	36 100	125
								I	12 650	1.04	10 500	41 800	0.62	35 800	123			
								S	12 250	1.04	10 200	40 500	0.60	34 600	115			
T1	3	2.250					0.400	P	9 600	0.78	10 700	42 300	0.63	31 400	95			
T2	3	2.250					0.400	S	9 600	0.78	10 700	42 300	0.63	31 400	95			
7178-T6510	0.625	6.9	317997	L1	3	2.250	0.620	P	9 300	0.74	6 700	24 500	0.29	18 100	31			
				L2	3	2.250	0.620	S	9 300	0.74	6 700	24 500	0.29	18 100	31			
								Specimen failed in fatigue										
				T1	2	1.500	0.374	P	3 750	0.57	6 700	30 600	0.38	18 000	31			
				T2	2	1.500	0.374	S	3 750	0.57	6 700	30 600	0.38	18 000	31			
								Specimen failed in fatigue										
2.180	15.5	318140**	L1	4	3.000	1.010	I	16 000	1.01	5 300	20 100	0.24	17 000	28				
			L2	4	3.000	1.010	S	18 600	1.01	5 100	23 300	0.26	19 800	34				
							I	15 200	0.98	5 300	19 500	0.23	16 600	26				
							S	21 000	0.98	6 900	25 300	0.30	21 500	44				
			T1	2	1.500	0.498	S, M	5 800	0.52	7 800	30 800	0.41	18 500	33				
			T2	2	1.500	0.500	P	6 000	0.51	8 000	30 900	0.41	18 500	33				
2014-T62	0.300	6.3	318084	L1	1	0.935	0.296	I	3 780	0.33	13 700	55 600	0.83	26 900	68			
				L2	1	0.938	0.296	S	4 100	0.33	14 800	60 400	0.90	29 400	81			
								P	3 920	0.31	14 100	58 700	0.81	26 700	66			
								S	4 080	0.32	14 700	57 000	0.85	27 800	72			
				T1	1	0.933	0.269	I	3 750	0.32	13 300	52 100	0.82	25 300	60			
				T2	1	0.933	0.268	S	3 600	0.32	14 300	56 000	0.88	27 400	70			
7075-T62	1.225	21.2	318098**	T1	2	1.499	0.500	P	5 870	0.31	15 500	57 800	0.91	28 500	76			
				T2	2	1.499	0.500	S	5 870	0.31	15 500	57 800	0.91	28 500	76			
								S, M	5 800	0.52	9 300	37 100	0.52	22 300	48			
								P	7 500	0.52	10 000	39 700	0.56	24 000	55			
								I	7 100	0.52	7 500	37 600	0.53	22 600	49			
								S	7 375	0.52	9 800	39 100	0.55	23 500	53			
7075-T73X	1.225	21.2	318099**	T1	2	1.499	0.501	I	6 400	0.57	8 500	39 100	0.60	23 200	52			
				T2	2	1.500	0.500	S	6 700	0.57	8 900	40 900	0.63	24 400	57			
								P	8 125	0.50	10 100	40 600	0.63	24 800	59			
								S	8 125	0.50	10 800	40 600	0.63	24 800	59			

* L - Longitudinal; T - Transverse

† Nature of Pop-in Indication: M - Maximum Load
P - Clear Pop-in, below maximum load without significant prior deviation from linearity
I - Initial significant deviation from linearity
S - 5 per cent secant offset

‡ At start of fracture toughness test, i.e., after fatigue cracking

§ P/AB

** Combined (P/A + Mo/I) stress at tip of crack

†† $K_{IC} = K_{IC}^2 (1 - \mu^2) = \frac{P^2}{B^2} \left[\frac{7.59}{B} - 32 \left(\frac{B}{a_0} \right)^2 + 117 \left(\frac{B}{a_0} \right)^3 \right]$; ref: ASTM STP 411.

B = modulus of elasticity, psi

K_{IC} = plane-strain strain-energy release rate, in.-lb/in.²

K_{IC} = plane-strain stress-intensity factor, psi√in.

P = load, lb, at unstable crack growth

B = thickness, in.

W = gross width, in.

** Producer B, all others are Producer A

μ = Poisson's ratio = 0.33 for aluminum alloys

a = a₀ + $\frac{K_{IC}^2}{\sigma_{ys}^2}$ = actual crack length, in., plus plastic-zone

correction factor, in.

σ_{ys} = tensile yield stress, psi

TABLE XIX

RESISTANCE TO STRESS-CORROSION CRACKING OF STRESS RELIEVED
STRETCHED ALUMINUM ALLOY EXTRUSIONS

Alloy	Section Thickness, in.	Number	Longitudinal			Stress - 75% Yield Strength*			Short Transverse		
			F/N†	Days††	Tensile Strength††† in	F/N	Days††	Tensile Strength in	F/N	Days††	Per Cent Loss in
2014-T6510	0.250	340154	Not in Test			Not in Test					
	0.255	317942	0/2	84	29	0/2	84	22		Not in Test	
	0.510	317946	0/2	84	34	0/2	84	25			
	0.950	317944**	0/2	84	18	1/2	F31, (OK 84)	42	2/2	F-6, 6	
	1.200	317946**	0/2	84	14	2/2	F-7, 7		2/2	F-6, 6	
2024-T3510	2.760	318048	0/2	57	--	2/2	F-12, 26‡	--	1/2	F-40 (1 OK 84)	
		340214	Not in Test			Not in Test				Not in Test	
	0.255	317890	0/2	84	5	0/2	84	8			
	0.510	317892	0/2	84	8	0/2	84	7			
	0.950	317893**	0/2	84	6	0/2	84	9	0/2	84	
2024-T8510	1.200	317895**	0/2	84	--	0/2	84	10	0/2	84	
	2.760	318079	0/2	57	--	0/2	57	--	0/2	84	
		340225	Not in Test			Not in Test				Not in Test	
	0.315	317923	0/2	84	0	0/2	84	0			
	0.375	317827	0/2	84	4	0/2	84	1			
6061-T6510	1.240	317907	0/2	84	0	0/2	84	0			
	1.960	317896	0/2	84	0	0/2	84	0			
		340226	Not in Test			Not in Test				Not in Test	
	0.375	317954	0/2	84	3	1/2	F17, (OK 84)	7			
	0.438	317859	0/2	84	3	0/2	84				
7075-T6510	0.925	340155	Not in Test			0/2	Not in Test			Not in Test	
	1.188	317860**	0/2	84	3	0/2	84	6	2/2	F-6, 6	
	2.190	318137	0/2	57	--	1/2	F-8, (OK 57)	--	2/2	F-4, 4	
	3.040	318138	0/2	57	--	2/2	F-4, 4		2/2	F-9, 9	
	0.375	317900	0/2	84	0	0/2	84	0			
7075-T7510	0.438	317910	0/2	84	2	0/2	84	3			
	0.935	340292	Not in Test			0/2	Not in Test			Not in Test	
		340253	Not in Test			Not in Test					
7079-T6510	0.625	317997	0/2	84	9	1/2	F81, (OK 84)	14			
	1.200	318139	0/2	57	--	2/2	F-3, 7	--	2/2	F-4, 5	
	2.180	318140	0/2	57	--	2/2	F-7, 7	--	2/2	F-4, 4	

Notes: * Specimens and test environment are described in the first Quarterly Report.

† F/N denotes number of specimens failed over number exposed.

†† Tests in progress for periods shown, with maximum duration of 84 days.

††† Results are average values for tension tests of specimens which did not fail by stress-corrosion cracking.

* Short transverse yield strengths determined by tests of duplicate 0.050" diameter tension specimens.

‡ The directionality of this section is being examined microscopically.

TABLE XIX (Continued)

RESISTANCE TO STRESS-CORROSION CRACKING OF ALUMINUM ALLOY
EXTRUSIONS - HEAT TREATED AND AGED BY USER*
(TESTS STILL IN PROGRESS)++

Alloy	Sample Section Thickness, In.	Number	Stress- 75% Yield Stress*					
			Longitudinal		Long Transverse		Short Transverse	
			F/N+	Days	F/N	Days	F/N	Days
2014-T62	0.300"	318084	1/2	F-24***, (OK57)	1/2	F-24 (OK 57)	---	----
2024-T42	0.430"	340241	Not in test		Not in test		---	----
		340245	Not in test		Not in test		Not in test	
2024-T62	0.430"	340242	Not in test		Not in test		---	----
		340246	Not in test		Not in test		Not in test	
6061-T62	0.246" 1.625"	318090	0/2	57	0/2	57	---	----
		318091	0/2	57	0/2	57	0/2	55
7075-T6	0.350" 1.225"	318096	0/2	57	0/2	57	---	----
		318091	0/2	57	0/2	57	2/2	F-7, 7
7075-T73X	0.350" 1.225"	318097	0/2	57	0/2	57	---	----
		318099	0/2	57	0/2	57	0/2	62
7178-T6		340249	Not in test		Not in test		---	----

* Sections submitted in the -0 temper. Solution heat treated and aged at these Laboratories.

** Specimens and test environment are described in the first Quarterly Report.

+ F/N denotes number of specimens failed over number exposed.

++ Tests in progress for periods shown, with maximum duration of 84 days.

+++ Failed in shoulder, outside the gauge length.

TABLE XIX (Continued)

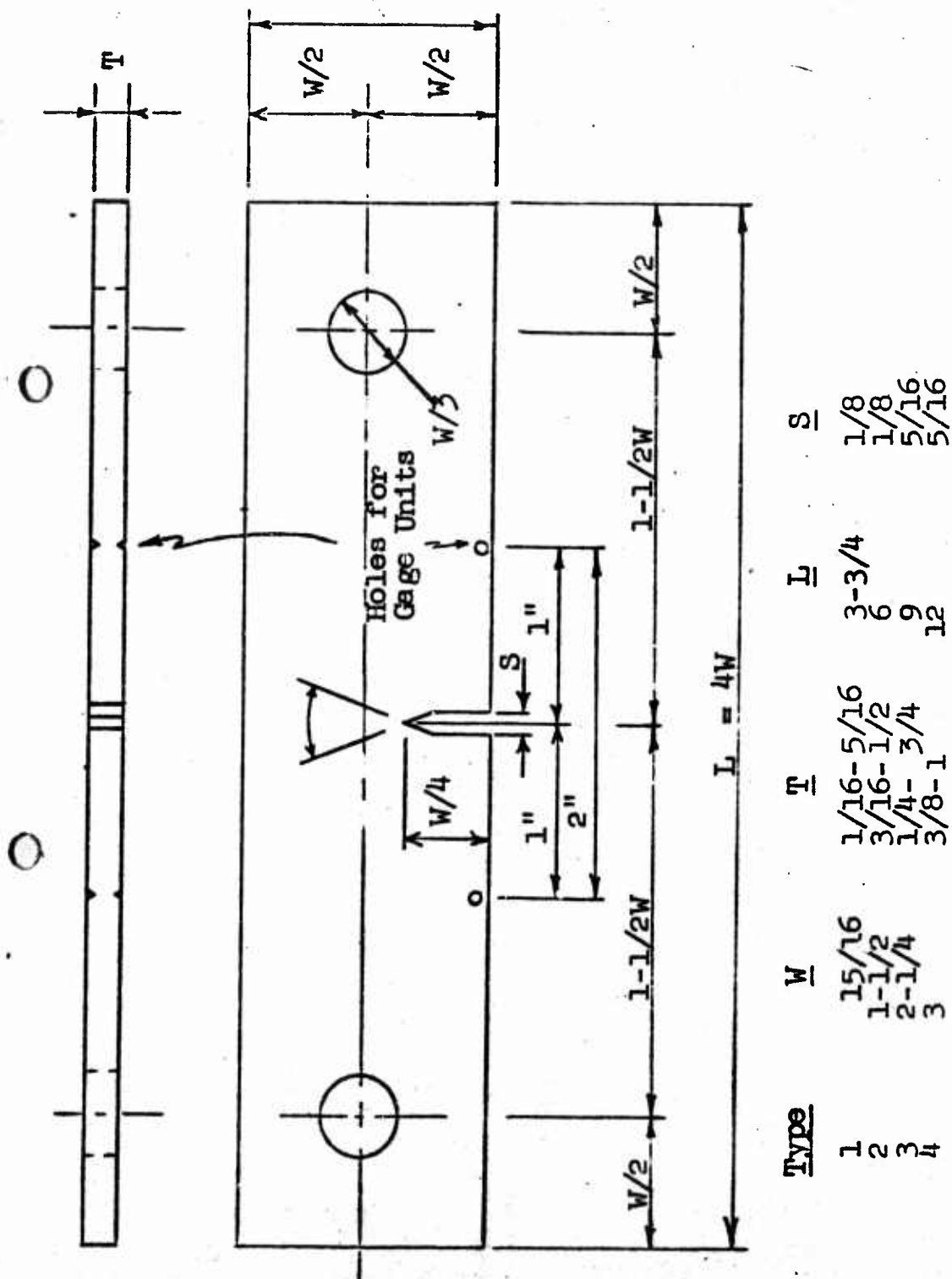
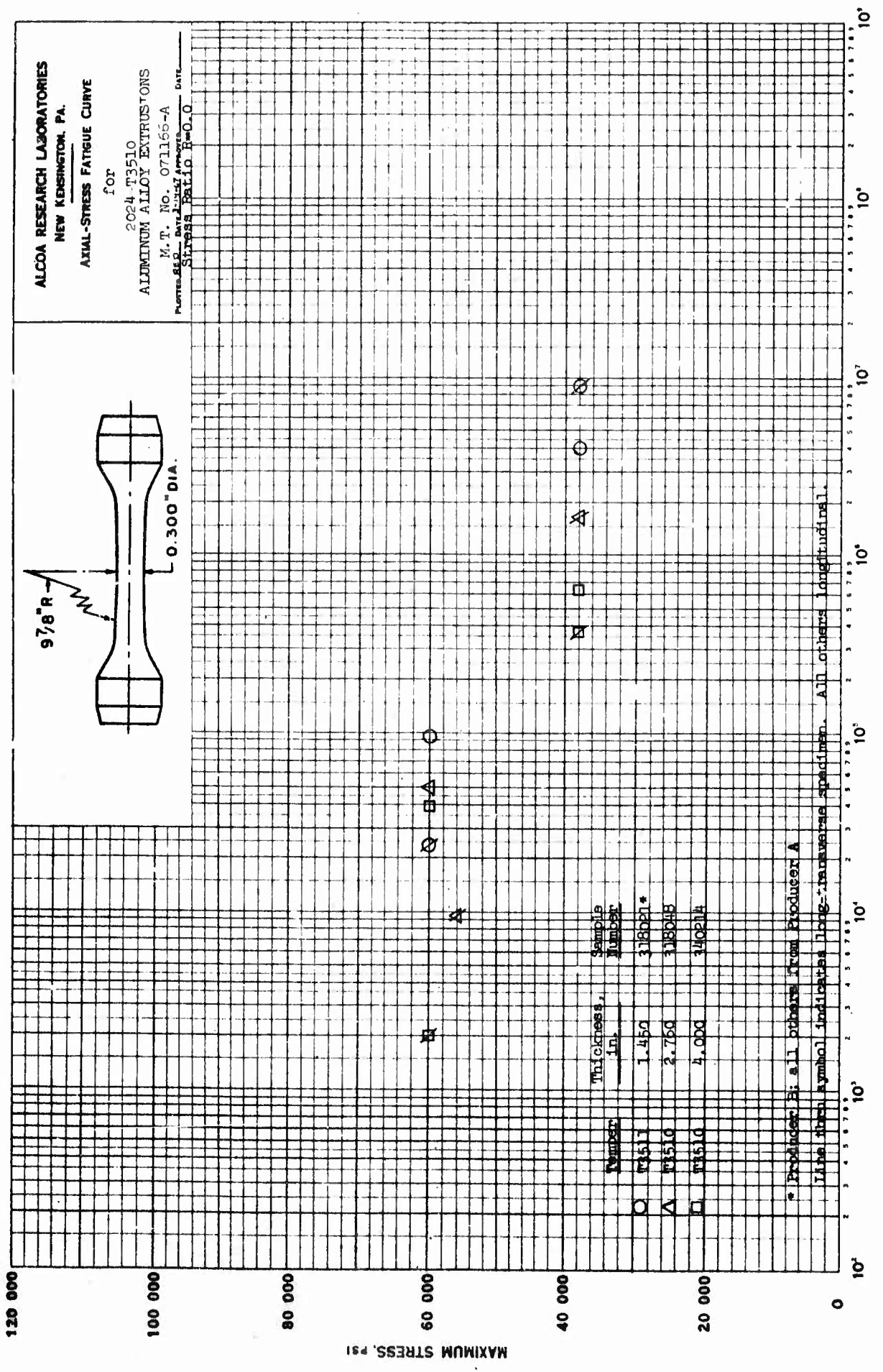


Fig. 1 Single-Edge-Notched Fracture-Toughness Specimens.



C Y C L E S

Fig. 2

